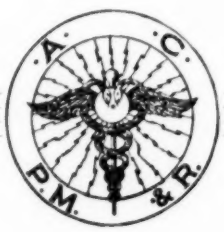
Archives of

PHYSICAL MEDICINE AND REHABILITATION

(Formerly Archives of Physical Medicine)

Official Journal
American Congress of Physical Medicine and Rehabilitation
American Society of Physical Medicine and Rehabilitation



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VOLUME XXXIV MAY, 1953 NO. 5

ANNUAL SESSION • CHICAGO • AUGUST 31-SEPTEMBER 4, 1953

American Congress of Physical Medicine and Rehabilitation

31st Annual

Scientific and Clinical Session

and

Instruction Seminar

August 31 through September 4, 1953

Official Headquarters

THE PALMER HOUSE
Chicago

EXECUTIVE OFFICES

30 NORTH MICHIGAN AVENUE CHICAGO 2, ILLINOIS

INSTRUCTION SEMINAR

in conjunction with the

31st Annual Scientific and Clinical Session

American Congress of Physical Medicine and Rehabilitation

PALMER HOUSE — August 31, September 1, 2, 3, 4, 1953 — CHICAGO

TENTATIVE SCHEDULE

MONDAY MORNING — AUGUST 31

(A) 9:00-9:50 A.M.
Pathological Physiology of Lesions of the Cervical Portion of the Spinal Cord and Brachial Plexus
Pollock

(B) 10:00-10:50 A.M.
Pathological Physiology of Lesions of the Lower Spinal Cord and Lumbar and Sacral Plexus
Pollock

MONDAY AFTERNOON — AUGUST 31

(C) 3:00-3:50 P.M.
Electromyography—Basic Physiology of the Motor Unit and Its Electrical Activity and Responses
Lambert

(D) 4:00-4:50 P.M.
Electromyography Clinical Techniques
Lambert

TUESDAY MORNING — SEPTEMBER 1

(E) 8:30-9:20 A.M.
Physiological Principles of Artificial Respiration
Kubicek

WEDNESDAY MORNING — SEPTEMBER 2

(F) 8:30-9:20 A.M.
Physiological Background for Neuromuscular Reeducation and Coordination
Knowlton

THURSDAY MORNING — SEPTEMBER 3

(G) 8:30-9:20 A.M.
Pathology of Trauma and Its Implications in Physical Treatment
Knapp

FRIDAY MORNING — SEPTEMBER 4

(H) 8:30-9:20 A.M.
Anatomy of the Cervical Portion of the Spinal Cord and Brachial Plexus
Hollinshead

MONDAY MORNING — AUGUST 31

Symposium on Cerebral Palsy

(1) 9:00-9:20 A.M.
Therapeutic Exercise for Athetosis and Spasticity
Perlstein

(2) 9:20-9:40 A.M.
Bracing for Athetosis and Spasticity
Allen

Discussion Period

(3) 10:00-10:20 A.M.
Neurosurgery in Cerebral Palsy
Fay

(4) 10:20-10:40 A.M.
Preschool Training of Cerebral Palsy
Gillette

Discussion Period

MONDAY AFTERNOON — AUGUST 31

(5) 3:00-3:50 P.M.
Principles of Muscle Reeducation
Bennett

(6) 4:00-4:50 P.M.
Methods of Application of Mass Movement and Facilitation Techniques for Therapeutic Exercise
Kabat

TUESDAY MORNING — SEPTEMBER 1

Symposium on Multiple Sclerosis

(7) 8:30-8:50 A.M.
Use of Drugs
Sweeney

(8) 8:50-9:10 A.M.
Rehabilitation Procedures and Aids
Gordon

Discussion Period

WEDNESDAY MORNING — SEPTEMBER 2

(9) 8:30-9:20 A.M.
Microthermy: Physiological Basis for Its Use, Indications and Dangers
Rae

THURSDAY MORNING — SEPTEMBER 3

(10) 8:30-9:20 A.M.
Classification, Diagnosis and Treatment of Myelopathies
Marks

FRIDAY MORNING — SEPTEMBER 4

(11) 8:30-9:20 A.M.
Complications of the Use of Hormones in the Treatment of Rheumatism
Polley

Note: The Committee on Education of the American Congress of Physical Medicine and Rehabilitation is in charge of the instruction seminar. It is purposely planned to limit the subjects in any year to a few topics in order to devote enough time to those subjects to give those attending a good review, both from the standpoint of basic knowledge and from the clinical standpoint. Certain groups of these subjects will be repeated every three to five years.

Courses are offered in two separate groups: One group, designated by letters, consists of eight lectures on basic subjects. A second group of eight lectures, designated by numerals, will present more general and clinical subjects. Physicians as well as physical therapists who are registered with the American Registry of Physical Therapists will be permitted to register for these courses. Members in good standing of the American Occupational Therapy Association are also eligible to enroll for the instruction course.

The schedule of the seminar, as arranged, will permit attendance at both the course and scientific sessions.

Each registrant for the course is allowed the choice of one lecture during a period. The charge for the complete schedule of eight lectures is $15.00. Fewer than eight lectures may be scheduled at $2.00 per lecture. The right is reserved to reject any application if the Course Committee finds it desirable to do so. Registration for specific courses cannot be guaranteed when quotas are filled.

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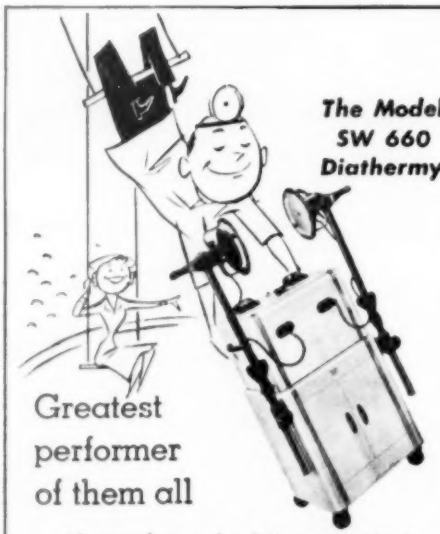

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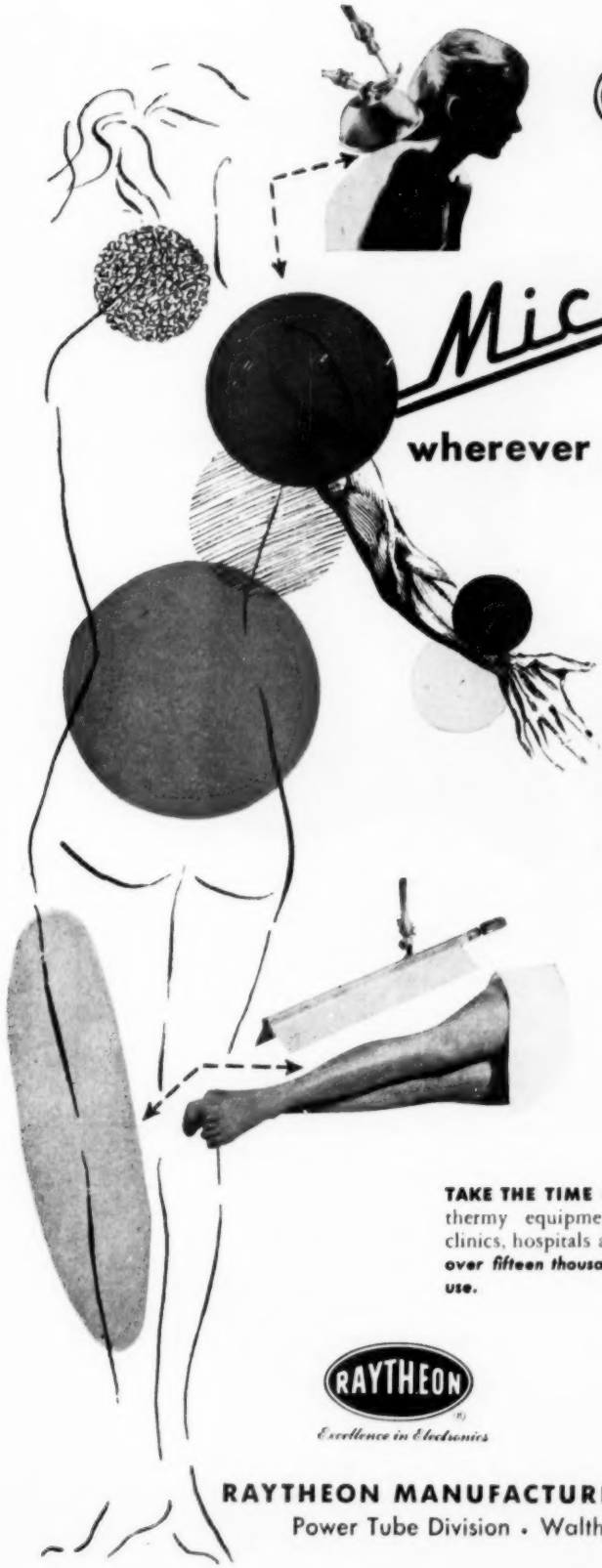

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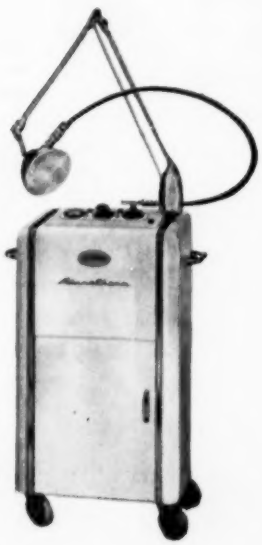

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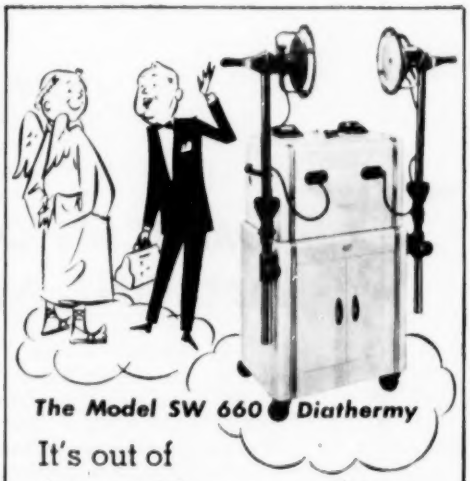

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To stimulate interest in the field of physical medicine and rehabilitation, the American Congress of Physical Medicine and Rehabilitation will award annually, a prize for an essay on any subject relating to physical medicine and rehabilitation. The contest, while open to anyone, is primarily directed to medical students, internes, residents, graduate students in the pre-clinical sciences and graduate students in physical medicine and rehabilitation. The Annual Awards Committee suggests that members of the American Congress and American Society of Physical Medicine and Rehabilitation bring this announcement to the attention of interested persons. The following rules and regulations apply to the contest:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 1, 1953.

3. Contributions will be accepted from medical students, internes, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 5000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200, a gold medal properly engraved, a certificate of award and an invitation to present the contribution at the 31st Annual Session of the American Congress of Physical Medicine and Rehabilitation at the Palmer House, Chicago, August 31 through September 4, 1953.

8. The winner shall be determined by the Annual Awards Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Annual Awards Committee, no contribution is acceptable. The Congress may also award certificates of merit to contributors whose essays may be considered second and third best submitted. Announcement of the winner will be made before August 1, 1953. Officers and members of the American Congress and the American Society of Physical Medicine and Rehabilitation are not eligible for this award.

Contents — May 1953

Volume XXXIV No. 5

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

(Formerly Archives of Physical Medicine)

30 North Michigan Avenue, Chicago 2, Illinois

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EDITOR OF THE MONTH

GEORGE M. PIERSOL, M.D.

Philadelphia

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For a number of years—actually since the early development of fever therapy in which I took a deep personal research interest and some activity, I have been increasingly aware of the desirability of placing the accomplishments in physical medicine and rehabilitation more effectively before our undergraduate medical students. It is only by so doing, early in their medical careers, that this rapidly growing specialty may be seen in its proper relationship and perspective to the other, older, special phases of medicine. It is usually during the undergraduate medical years that the medical leaders of tomorrow, in both research and practice, find and choose their special fields for later intensified study and mastery, and for personal research contributions. More often than not, it is the enthusiasm and devotion of a gifted teacher, which first attract the apprentice medical student to the needs and possibilities in a given field of medicine, and converts are more readily made and held during these formative undergraduate years in medical school, than later. Proselyting is as costly, as uncertain, and as unwelcome in Medicine as in Religion.

It is, therefore, incumbent on the medical school deans to choose carefully their departmental and divisional heads for all undergraduate medical teaching; the wise dean must play no favorites, and must be certain to recruit new leadership in every one of the widely diverse fields of medical research and medical practice, — to all of which the American public is looking with ever-increasing confidence and expectation for new and better answers to old, decreasingly resistant problems. And with more than 7,500 new eager recruits entering our medical schools each Fall, the field is ripe for the harvest for those teachers who would recruit for their particular causes.

Thus, our first concern at The Ohio State University has been to seek, in the proper places, the best personnel to direct our emerging and rapidly developing program in physical medicine as an integral unit in the new Medical Center at Columbus. This was not an easy task, because of the relative newness of the field in terms of specialization-training, which in turn is responsible for the limited number of modernly trained physiatrists in relation to the rapidly growing demand. At this point I cannot refrain from paying a personal tribute to Dr. Krusen, who, over a period of years, has given wise and continuing counsel to us, even as he has to many of you. It was through his interest and advice, that we were first put in touch with Dr. Ralph Worden, — a trainee of Drs. Krusen and Elkins. Dr. Worden is presently Director of our Department of Physical Medicine and the Rehabilitation Center. Since Dr. Worden arrived on the scene, the Dean has had no further cause for concern about the place of physical medicine, in the curriculum and services at Ohio State University.

Together we have been developing our teaching and rehabilitation program as interdependent phases along the lines recommended to the Association of American Medical Colleges last year jointly by Dr. Earl C. Elkins, Chairman of the Advisory Committee on Education and Dr. Frank H. Krusen, Chairman of the Council on Physical Medicine and Rehabilitation of the American Medical Association. All four of our undergraduate medical classes are now exposed to some contact with physical medicine.

*Read at the Thirtieth Annual Session of the American Congress of Physical Medicine, New York, N. Y., Educational Conference, August 25, 1952.
**Dean, College of Medicine, Ohio State University, Columbus, Ohio.

We start off the freshman medical students in the Department of Anatomy with lectures on functional anatomy given by a physiatrist from the Clinical Department at the completion of the dissection of each region on the cadaver, with the appropriate clinical emphases. A series of joint two-hour seminars, inaugurated last year, between the Department of Anatomy and the Department of Physical Medicine, were so successful and productive of mutual stimulation, that they have been made a part of the permanent programs of both departments.

In the sophomore year, a portion of the preparatory course in surgery has been devoted to a discussion of the relation of physical medicine to post-surgical care and convalescence.

The junior medical students receive ten hours of didactic lecture-demonstrations, which provide the widest possible coverage of the entire field of physical medicine in its application to rehabilitation. To conserve teaching time, critically summarized data covering the principles of therapeutic exercise, the variety of technical modalities available, and the pathologic indications and physiologic contra-indications for their use are distributed to each student in mimeographed form at the beginning of this series of conference hours, with instructions to become familiar with these basic considerations at once. Carefully selected patients, from clinic and hospital, are then presented during each teaching session, to demonstrate differential diagnostic procedures, the indicated applications of therapy, and the follow-up evaluation of treatment. In addition to these formally scheduled exercises, it should be pointed out that the physiatrist participates regularly as a part of the team in medical and surgical conferences and on grand rounds each week, even as does the roentgenologist, offering advice and suggestions, whenever and wherever appropriate. In Pediatrics at the Children's Hospital, where our poliomyelitis cases are concentrated, the personnel from the Department of Physical Medicine and Rehabilitation take a particularly prominent and important part in the consideration of each individual case. Severely burned children and traumatic cases on both orthopedic and neurosurgical services also come in for special attention. These day-to-day contacts and consultations provide an invaluable exposure of junior medical students, resident house staff and attending faculty to the problems presented for, and solved by, the physical medicine approach.

All senior medical students experience a minimum of nine hours devoted to physical medicine and rehabilitation, presented to small sections of ten students each. The three periods of three hours each are divided as follows: (1) the first hour is spent on a review and demonstration of the various physical modalities, — the students themselves being the subjects, — giving to and receiving from each other specimen treatments wherever possible; (2) the second hour is spent in the outpatient clinic observing and analyzing specific case problems, and (3) the third hour is spent in making ward rounds on house patients currently undergoing physical therapy rehabilitation under the immediate supervision of the staff physiatrists. It is felt that by spending three consecutive, three-hour periods in this type of review and resurvey, the graduating senior medical student will carry with him a very good appreciation of the equipment and technics, as well as the types of patients accepted for treatment, in both out-patient and in-patient services, by this department.

That this program is capturing the imagination of many of our undergraduate medical students is attested by the number of inquiries currently coming to Dr. Worden regarding further training opportunities in his department.

The interdependence and necessity for coordination of Occupational Therapy with the rehabilitation program is recognized at Ohio State University, where a special department and school were organized in 1940 under the joint auspices of the Colleges of Medicine and Education. With the completion of the new Medical Center, the activities and headquarters of the Department of Occupational Therapy have been moved into

the new University Hospital, where they are in close geographic association with the School for Physical Therapists, now in the final curriculum-planning stage.

Finally, a word should be said about the new State Rehabilitation Center, which is emerging on the University Campus at Columbus. The last Ohio State legislative assembly, stimulated by a common interest in both labor and management circles, passed an amendment to the Workman's Compensation Law of Ohio providing for referral by its medical division of selected industrial accident cases to the Center for review. When, and if, found acceptable by the Center screening committee for a specific rehabilitation program, the costs for such patients are paid out of the funds controlled by the Commission up to a maximum total of $300,000 for the current biennium. Both acute hospital beds and dormitory housing are available, so that at the earliest possible time the rehabilitees may be removed from an "hospital atmosphere" into more normal living quarters and surroundings during the major portion of their time of directed readjustment and supervised reeducation. Professor Kenneth Hamilton, an authority on the social and economic aspects of rehabilitation in the School of Social Administration at Ohio State, has accepted the Associate Directorship of the Rehabilitation Center and will be Director of Social Services. Liaison has been established with the State Employment Agency, the Bureau of Vocational Rehabilitation, and all other existing community and University services; these agencies have representation on screening and evaluation committees.

Candidates for rehabilitation will be reviewed, and be accepted or rejected on their respective merits by one single screening committee but from three potential sources: (1) as referred by the Industrial Commission; (2) as referred by the self-insuring industrial concerns in the State, and (3) as referred by any physician desiring this particular type of service for his patients. The rehabilitee's personal physician in every instance must first approve of and request this service for his patient before the screening committee will consider the case, and he (the family physician) will then be invited to become a part of the evaluation team which will follow and direct the individual rehabilitation program (for *his* patient) to and through the phase of reemployment. Likewise, the rehabilitee's family will be made an integral part of the planning, — before, during and after the Center program is being consummated. A better understanding on the part of involved labor stewards and employers, and a more cordial local community acceptance of such rehabilitees will be another major objective of the Center personnel. In these several ways it is hoped to consolidate individual physical gains, while building permanent patterns of social and economic independence at individual, family and community levels.

The successful realization of this comprehensive program of rehabilitation will provide both the clinical material and the incentive for the best possible teaching, not only at the undergraduate medical and social science levels, but also at the graduate, resident-training and fellowship-research levels. It will also provide for indoctrination of the general physicians of the state and nation in the newly appreciated possibilities of the role of the physiatrist and his technical associates in more effective human engineering. It is the hope of the faculty and administration of the Ohio State University that we may take full advantage of the notable progress being made in this field, — and that we may play our full part in contributing to the future advancement of the art and science of human reconstruction and social rehabilitation.

University-Sponsored Graduate Fellowship Training In The Medical Specialties*

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Graduate education in medicine should provide an opportunity for complete training in the clinical specialties; this requires adequate physical resources in patients, records, laboratories, libraries, hospital facilities and the essential technical adjuvants. As Louis B. Wilson has pointed out, the graduate program of the Mayo Foundation for Medical Education and Research has endeavored to include, in addition, the following educational advantages: 1. Appointees should be selected on the basis of merit only. 2. Careful selection should do away with the necessity for a pyramidal system; all appointees are assured of opportunity to complete the three-year program. 3. The program should provide for adequate freedom for "time to think," for laboratory studies and research and for flexibility to include individual variation in needs and desires. 4. The designation of the graduate trainees as "fellows" reflects the staff physicians' attitude toward these men as companions in learning rather than as apprentices or routine residents. 5. Sponsorship of weekly lectures by outstanding medical figures from all over the world stimulates and educates both staff and fellows. 6. The financial support of fellows is important. Although it is commonplace today, this was relatively unheard of in 1915, when the Mayo Foundation was started. Greater numbers of more qualified fellows are now able to continue their education at a graduate level. 7. "The fixed graduate-school requirement of attempted research by every member of its student body has been accepted by the Mayo Foundation because it believes that everyone competent to act as a consultant in a special field of medicine should have enough experience in controlled research to enable him to evaluate the research work of others and to conduct investigations himself in a scientific manner. He also may succeed in making a substantial contribution to the science of his field."

One of the interesting problems which medical education faces is that concerned with the relative needs, in manpower, of the various medical specialties. Once this need is determined, it must be decided how best to guide medical students into those fields whose requirements are most acute. At the present time, certainly, the problem is far from solved, and recruitment depends on the enthusiasm and energy of the current leaders of each specialty, on economic factors and on a crude application of the law of supply and demand. Many more trained persons are needed in physical medicine and rehabilitation at all levels.

The report of the Subcommittee on Teaching of the Baruch Committee on Physical Medicine presented in April, 1944, stressed the limited number of persons who teach basic sciences in the clinical aspects of physical medicine. It emphasized the need for development of several schools that could offer good extensive graduate courses to train teachers who would have adequate backgrounds in basic research for clinical practice in physical medicine. At that time, only three institutions were approved for residencies or fellowships in physical therapy or physical medicine. One of these was the Mayo Foundation.

The first formal training in physical medicine under the auspices of the Mayo Foundation began in 1937. Although this training program prepares physicians for the practice of physical medicine and re-

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habilitation, the basic aim has been to prepare teachers qualified to head major centers. The number of graduates from the Foundation who now serve in that capacity indicates that the aims of these fellowships have been fulfilled.

A description of the training program in physical medicine and rehabilitation of the Mayo Foundation should be prefaced by a brief sketch of what has been called the "Minnesota experiment." In 1914, Dr. George Vincent, president of the University of Minnesota, proposed a plan whereby the educational program of the Mayo Clinic would become a part of the Graduate School of the University. This plan was completed in 1915. At that time there were no other university-sponsored graduate training programs in clinical medicine of a similar nature. The first American board offering certification in a specialty was the Board of Ophthalmology, founded in 1917. The American Board of Physical Medicine was incorporated in 1947 and became the American Board of Physical Medicine and Rehabilitation in 1949.

Prior to 1915, it was possible for any practitioner to attend a postgraduate course for a few weeks, return home, and call himself a specialist. Short of trial and error, the public had no means of determining his qualifications. The Mayos and President Vincent therefore determined to provide a graduate degree in the clinical fields, earned in a university atmosphere. The degree would require a thesis and examinations and at the same time would encompass practical training.

After much deliberation it was decided to offer the degrees of Master of Science and Doctor of Philosophy in named clinical specialties. The clinical field is an integral part of the degree, such as Master of Science in Physical Medicine and Rehabilitation. These degrees are offered to qualified candidates who meet the minimal requirements of three years' residency, of which six to twelve months must be spent in research in a basic science laboratory, and the successful completion of written and oral examinations. Some doubts were present initially as to whether it would be possible to place the clinical instruction in medicine on an academic level comparable to graduate teaching in the arts and sciences. Time has justified the ideals and vision of these pioneers in graduate medical education.

The staff of approximately 300 permanent members of the Mayo Clinic are, for the most part, members of the graduate faculty of the University of Minnesota. Their original appointments and subsequent promotions are recommended by a graduate committee of the Foundation and approved, after careful scrutiny, by a similar committee representing the Graduate School of the University and finally by the Board of Regents. Original appointment and promotion to this graduate faculty require interest and real accomplishment in scholarly productive research and evidence of teaching ability.

Candidates for fellowships are scrutinized carefully. It is considered that only those individuals who have made relatively superior scholastic records in medical school deserve this type of graduate training. The basic requirements are graduation from an approved medical school and an internship. Actually, the majority of fellows have had several additional years of training, which often this consists of experience in general practice. Such experience is quite valuable; it affords the graduate student a better comprehension of the reasons for the various assignments and provides a far more mature outlook. Most fellowship appointees have already served their required tour of active duty in the Medical Corps of one of the armed services and quite often have also had a year or two of residency training. Thus, these appointees have sound medical backgrounds and know what they want in the way of graduate training.

To obviate the criticism that the medical specialist learns more and more about less and less, graduate training should provide opportunities for keeping up with medicine as a whole. The Foundation endeavors to supply this need through several channels. In the first place, when 500 graduate fellows live with a staff of 300 physicians in a small

community, there is much rubbing of medical shoulders and a constant interchange of ideas. Each group is free to attend the seminars and conferences held in other specialty fields. Also, in the course of the three-year fellowship, evening lectures are given twice weekly by members of the clinic staff; the purpose of these is to review all fields of medicine and surgery and to present recent advances. Parenthetically, residence in a small town for three years provides the graduate student with a worth-while sociologic experience in learning to live with all kinds of people and to participate in civic activities.

It is safe to assume that the best type of graduate medical teaching takes place when a mature experienced consultant and a competent graduate student work together; when the graduate student has the opportunity to examine patients and to recommend treatment under the supervision of a full-time highly trained specialist. This is true preceptorship and most of us would agree that, at the graduate level, it cannot be surpassed. Dr. Will Mayo once told a group of entering graduate students, "Here is a laboratory; here is a library; here is a staff. Get their advice and educate yourself. In short, here is an opportunity. What you make of it is your responsibility."

Each Wednesday evening a general clinicopathologic conference is held, during which current necropsy reports are presented and discussed by clinicians as well as pathologists. Following this, there is a general staff meeting for staff, fellows and visiting physicians. A part of each of these meetings is devoted to the presentation of original research by fellows. On Thursday evenings, visiting physicians from the United States or abroad present topics of general interest. On Monday and Friday nights the general clinical lectures already referred to, are given throughout nine months of the year. Tuesday evenings are devoted to departmental seminars, at which time the men in physical medicine and the other specialties meet in their own sections to hear presentations by the fellows. These papers are followed by comments and discussion by the staff. A new program is arranged each year and an attempt is made to cover timely topics as well as to review each field, during a three-year period. In addition to these didactic teaching sessions, other conferences and seminars are held throughout the day in the various specialty sections.

Each fellow is registered as a graduate student in the University of Minnesota and, at the end of each quarter, his grades are recorded in the Foundation Office and at the University. In addition, the Foundation keeps a record of comments made by the staff in evaluating the work of individual fellows. At the end of the fellowship, a reasonably complete record of the quality of the work, personality and character of each fellow has been obtained.

Because of the quarter system, considerable flexibility in the training program is possible. Fellows who have special interests may take one or more quarters in a variety of different fields, thus allowing for individual needs.

As already mentioned, one of the requirements for the graduate degree is time devoted to a basic science laboratory logically related to the clinical field. In physical medicine, the usual choices are physiology, biophysics or anatomy. For a minor in physiology, a minimum of nine months' full time is required. A fellow may be assigned to do experimental work in the laboratory at any time during the fellowship program, but usually this assignment falls in the second year. Prior to such studies, he explores the research activities of the various individuals under whom he might work and decides in a general way the type of problem he would like to pursue. In order to give some idea of the nature of the research which fellows in the Mayo Foundation have undertaken in partial fulfillment of the requirements for the degree of Master of Science in Physical Medicine and Rehabilitation, here are the titles of some of the theses that have been presented during the last few years: "Effects of Generalized and Localized Application of Heat and Massage on Peripheral Circulation as Measured by Skin Temperatures of the Extremities of Nor-

mal Persons and Patients Suffering With Rheumatoid Arthritis"; "Evaluation of Treatments of Frost Bite With Special Study of the Reaction of the Minute Blood Vessels"; "The Effect of Short Wave Diathermy on Intestinal Activity"; "The Effect of Microwaves on Bone and Bone Marrow and on Adjacent Tissues"; "Effects of Direct Heating and of Ultrasonic Irradiation on Conduction in Bullfrog Sciatic Nerve"; "The Effect of Short Wave Diathermy on the Blood Pressure of the Dog." Obviously, research interests will change with the timeliness of various subjects.

In physiology there are three conferences each week, so designed that a complete review of the entire field is provided. During this period, fellows in physical medicine are given an opportunity to study electromyographic technics and their interpretation. At the completion of his work, the fellow presents his findings at departmental conferences. Also, his results may be presented formally at a staff meeting and occasionally, when a paper is superior, it may be submitted for presentation before a national society. A number of Mayo Foundation fellows have presented papers before this Congress. The Foundation subsidizes expenses of fellows selected to present papers at national meetings because of the obvious educational advantages which such experiences afford. The results of the laboratory studies are incorporated in a thesis which is submitted to members of the faculty of the Foundation and of the University for approval.

The remainder of the three years is spent in clinical studies. Toward the end of the fellowship, written examinations in the minor and major subjects are given and the fellow then presents himself for a comprehensive oral examination at the University of Minnesota. The committee for this examination consists of members of the faculty of the Mayo Foundation and of the University. Occasionally, an outstanding student may qualify as a candidate for the Ph. D. degree in a named clinical field. The requirements for this degree include those for the Master of Science and, in addition, knowledge of two foreign languages, a much more comprehensive thesis embodying significant original work and a far more comprehensive oral examination.

The Section of Physical Medicine and Rehabilitation has two principal geographic locations. One is near the main clinic building where ambulatory patients are seen for short-term therapy.

The other is at St. Marys Hospital, where, in addition to the type of material seen in the section devoted to outpatients, the center for rehabilitation is located. At St. Marys, twenty beds are devoted to patients assigned to this service. During epidemics of poliomyelitis or other emergencies, the number of beds may be considerably greater. In addition, many other patients are seen daily in consultation on other services. Fellows are assigned, during their first two quarters in the Foundation, to each of these services for three months. Each fellow takes care of 8 to 12 new patients a day on the outpatient service and 4 or 5 while at St. Marys Hospital. After the history and physical examination are completed, the patient is examined and therapy is prescribed by one of the senior consultants in the presence of the fellow. During these six months, the trainee learns all the basic physical therapeutic methods. He devotes sufficient time to master the electrodiagnostic and manual muscle-testing technics. At the termination of this period, he should be familiar with the fundamentals of physical therapy and physical medicine.

Fellows in physical medicine also are assigned for three months each to rheumatology, to neurology and, occasionally, to orthopedics. The rheumatologic service has an average census of approximately 40 hospitalized patients. The effect of administration of cortisone and other hormones is studied and particular attention is given to the different types of physical therapeutic procedures employed in the treatment of rheumatic disorders. While on neurology each fellow from physical medicine takes a detailed history and does a complete neurologic examination on approximately 4 new patients each day. He attends the

seminars, ward rounds and conferences given in the neurologic and psychiatric sections. He studies the neurologist's approach to the determination of muscular function and he can learn much from the neurologist regarding the interpretation of painful syndromes. He sees many patients who have the syndrome of protruded intervertebral disk and the more common neurologic degenerative diseases so often referred to physical medicine for treatment, particularly parkinsonism and the various myopathies. He also has an opportunity at this time to attend basic psychiatric conferences and to see examples of typical psychoneuroses, especially the conversion reactions. While on orthopedics, the fellow sees patients who have a large variety of acute and chronic orthopedic diseases; many of these patients will be referred to physical medicine for therapy. He also attends a weekly conference held by orthopedic surgeons and physiatrists for patients who have poliomyelitic disabilities.

Some fellows have had the good fortune to experience, on exchange basis, three months' training in the Department of Physical Medicine and Rehabilitation at New York University under the supervision of Dr. Howard Rusk. During the senior quarters of the fellowship each trainee serves as a first assistant, at which time his responsibilities are greater. He is given more freedom in diagnostic evaluation, in the prescription of therapy and, as his experience and acumen increase, his responsibilities approach those of a staff consultant. During this time he may also serve as a teaching assistant in courses in anatomy, first aid and the theory of massage, all of which are given to the technicians in physical medicine. Each man attends at some time during his fellowship a six months' course in anatomy, usually during the time he is assigned to a basic laboratory science. Here, for three afternoons a week, he reviews those aspects of anatomy of particular interest to the physiatrist, the muscular and peripheral nervous systems. Each session consists of a lecture for one hour and two hours of dissection.

Throughout the three-year fellowship, daily informal conferences are held in the department of physical medicine. Once a week fellows present cases to the technicians in physical therapy. Underlying the graduate teaching at all times is the informal and close relationship between fellows and staff in physical medicine. Because the total number of fellows in this specialty is never large at one time (7 at present) it is possible for the staff and fellows to become well acquainted both professionally and socially.

In conclusion, one may summarize by quoting Dr. Donald C. Balfour, formerly director of the Mayo Foundation, who said that, "The objectives of the Mayo Foundation are to offer a type of graduate training in the clinical fields, on a university basis, with a thorough knowledge of the underlying fundamental fields, so that those who complete such training satisfactorily will be qualified to begin practice in a special field in a scientific manner without supervision and be able to advance knowledge in that field." A surprisingly large number of Foundation fellows have successfully met these objectives.

The Section on Physical Medicine and Rehabilitation

of the American Medical Association meets

June 2, 3, 4, 1953, Hotel New Yorker,

New York City.

PLAN NOW to attend your section meeting!

Influence Of Frequency Of Muscle Stimulation On Circulation In The Stimulated Extremity*

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ROCHESTER, MINN.

(With the technical assistance of Robert Arns)

In 1841, Reid[1] suggested the use of electric stimulation as a treatment for paralyzed muscles. Recent work[2-6] has provided convincing evidence that electric stimulation retards the loss of weight and reduction in strength of denervated muscle. However, the most effective frequency of stimulation has not been established clearly. The purpose of this study was to attempt to determine the frequency of stimulation which would produce the greatest increase in blood flow in the extremity when its muscles are stimulated. Since the circulating blood brings nutritive elements and takes away waste products, it is possible that the frequency of stimulation, which causes the greatest increase in circulation, also may be most effective in retarding loss of weight and reduction in strength if the denervated muscles were effectively stimulated.

Kosman and associates[7] came to the conclusion that appropriate electric stimulation leads to a stronger and heavier muscle during both denervation and recovery. By using electric stimulation at maximal strength, Solandt and associates[6] found that the 25 cycle alternating (sinusoidal) current produced the best results with respect to retention of weight, and the 60 cycle current was second best. Both galvanic and faradic currents were inferior to the 25 and 60 cycle sinusoidal current. They obtained a linear relationship between the effectiveness and number of daily treatments. Fischer[8] noted best results when treatment with electric stimulation was started immediately after denervation.

Gutmann and Guttmann[2,3] observed early treatment to be more effective than late in retarding both the atrophy and the fibrosis, and that twice weekly treatments were ineffective as compared with daily treatment. Wehrmacher and associates[4] reported that electric stimulation was most effective in retarding atrophy when the muscles were subjected to maximal stretch permitted by anatomic attachments and restrained by weights in such a manner as to allow only minimal shortening during treatment. Electric stimulation failed to retard the atrophy which followed tenotomy. Eccles[5] found that all periods of stimulation from two seconds to two hours daily were equally effective in preventing total disuse atrophy. Osborne and associates[10] used a variable frequency wave generator supplying a pure sinusoidal current at a modulation frequency of twenty-four times per minute. The treatment consisted of stimulation for ten minutes, six days of each week. They concluded that with such treatment atrophy can be greatly retarded or even prevented.

Grodins and associates[11] chose a frequency of 25 cycles, in the treatment of muscles by electric stimulation because this frequency produced a completely fused smooth tetanic contraction and maximal isometric tension. They modulated the carrier frequency by a "surging" mechanism to produce 40 contractions per minute.

Methods

Dogs weighing more than 12 kg. were used in this study. The dogs were divided into two groups but all were anesthetized with pentobarbital sodium. In one group the sciatic and femoral nerves were exposed at the base of the thigh and the

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**From the Division of Experimental Medicine, Mayo Foundation, Rochester, Minn.

electrodes, housed in a small unit, were placed on each of the nerves for stimulation of that extremity.

In another group of dogs all procedures were the same except that instead of exposing the nerves the electrodes were applied to the shaved skin for percutaneous stimulation. After exploration the active electrode was placed over the area on the thigh which gave the most vigorous response and the inactive one was applied around the ankle. An electronic stimulator with a pulse duration of one sigma was used in this study. Various frequencies ranging from 4 to 256 stimuli per second were used. The intensity of the stimulus was the same for all frequencies. The blood flow was recorded by means of bubble flow meters connected to the femoral artery and sometimes also to the femoral vein in the femoral triangle. The bubble flow meter used in this study was a modification of the Dumke and Schmidt[12] flow meter. The animals were well heparinized before the flow meters were connected to their vessels and throughout the duration of the experiment.

After control values for optimal strength of stimulation and blood flow were established, each frequency of stimulation was applied for fifteen minutes. Blood flow was determined in this period at the end of one, five, ten and fifteen minutes. Stimulation was then stopped but measurements of blood flow were continued at regular intervals for at least fifteen minutes. The changes in blood flow were compared with the various frequencies used for stimulation, and curves were constructed to represent the maximal and average increases in blood flow in cubic centimeters and in percentage over the control values.

Results

All the frequencies of stimulation produced, in all the dogs, significant increases in blood flow in the stimulated extremity over the control values. The findings from the contralateral unstimulated extremity varied. At times the flow did not change during the stimulation of the opposite limbs, occasionally it increased but often it showed a decrease in comparison to the control flow. The average percentage increases in blood flow during electric stimulation over the control values in the different dogs were calculated and the following findings were obtained. With direct stimulation of the nerve at a frequency of 4 stimuli per second the increase of blood flow in the stimulated extremity averaged 64 per cent; at 8 stimuli per second 187 per cent; at 16 per second 211 per cent; at 32 per second 196 per cent; at 64 per second 56 per cent; at 128 per second 61 per cent and at 256 per second 36 per cent. With percutaneous electric stimulation at a frequency of 4 stimuli per second the increase of blood flow in the stimulated extremity averaged 67 per cent; at 8 per second 105 per cent; at 16 per second 173 per cent; at 32 per second 108 per cent; at 64 per second 83 per cent; at 128 per second 47 per cent and at 256 per second 47 per cent.

Figures 1 and 2 show the effects of electrical stimulation of a nerve upon the blood flow through the vessels of the stimulated extremity. Figure 1 shows the effects when electricity is applied directly to the exposed nerve; Figure 2 shows the effects when the electricity is applied through the intact skin. The increase in blood flow occurred immediately after stimulation was started and persisted throughout the period of stimulation. It can be seen from the blood flow curves that the average increases were not much less than the maximal increases, especially for the lower frequencies of stimulation. From the curves showing blood flow it can be concluded that, even though all frequencies gave significant increases, a frequency of 16 stimuli per second practically always gave the greatest maximal and average increase in blood flow over the control throughout the period of stimulation.

In 60 of the observations in which blood flow was recorded for both the stimulated extremity and the contralateral unstimulated one, the following findings were noted on the unstimulated extremity. In 14 experiments the unstimulated extremity showed increase in

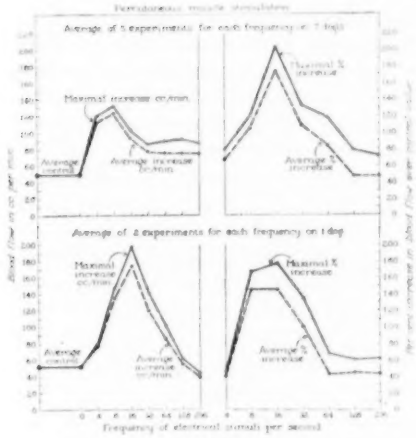

Fig. 1

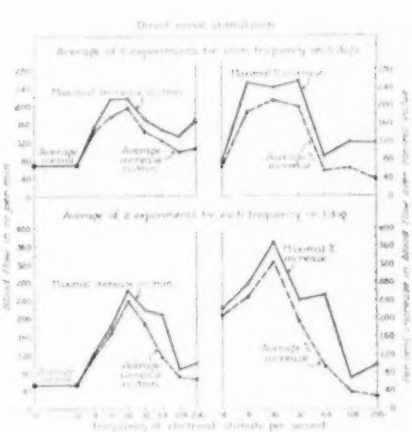

Fig. 2

Fig. 1—Blood flow values from the femoral artery in cubic centimeters per minute and in percentage over the control before and during percutaneous stimulation of the muscles of that extremity at various specified frequencies.

Fig. 2—Blood flow values from the femoral artery in cubic centimeters and in percentage over the control before and during electric stimulation of the femoral and sciatic nerves at various specified frequencies.

blood flow averaging 19 per cent with a range of 7 to 44 per cent during stimulation of the contralateral limb over that of the control period. In 38 experiments the blood flow in the unstimulated extremity decreased an average of 32 per cent with a range of 11 to 62 per cent over the control. In 8 experiments the blood flow of the unstimulated extremity showed no change during stimulation of the contralateral limb. From these data it is evident that most of the observations on the unstimulated limb showed a decrease in blood flow during stimulation of the contralateral extremity. This is considered substantial evidence in support of the assumption that the quantity of circulating blood is redistributed according to tissue demands; namely, more to the activated and less to the unactivated parts of the body.

Comment

When the mechanical response of a skeletal muscle is recorded, the amplitude is considered to be a function of the frequency of stimulation of its motor nerve. Simple isolated single twitches are produced by a very low frequency of stimulation. With increase in the frequency of stimulation the contractions tend to be fused, first incompletely, and at higher frequencies, completely. These are spoken of as partially and completely tetanic contractions.

Rosenblueth and Luco[13] noted that with high frequencies of stimulation (400 to 500 per second) the mammalian striated muscles do not exhibit a simple rise of tension lasting throughout the period of stimulation, but exhibit a series of rises and falls of tension. The falls of tension denote a lack of transmission of the motor nerve impulses. This was given as evidence that the stages of contraction correspond to a succession of periods of effective and ineffective neuromuscular transmission. Even at moderate frequency of stimulation (60 per second) if the stimulation period is prolonged, the first rise in tension is not maintained; there is a gradual reduction in tension until it reaches zero within one hour. The period during which impulse transmission is absent corresponds to the period of fatigue. Rosenblueth[14] reported that in the cat, with frequencies less than 40 per second applied to the motor nerve, the initial rise of tension slowly declines, but this decline denotes contraction fatigue and not transmission fatigue.

Evidence presented by various authors

suggests that the duration of the period of stimulation is of minor importance. Eccles[9] found that daily periods of stimulation ranging from ten seconds to two hours were equally effective in preventing total disuse atrophy. Solandt and co-workers[5] found no difference in effect of daily treatment for one, two, three or five minutes. Wehrmacher and associates[6] varied the length of treatment from three to 180 seconds. They noted that effectiveness was independent of the duration of treatment in this range. In order to insure a definite and maximal effect on the blood flow for this study it was decided to apply stimulation at each frequency for fifteen minutes.

Electric stimulation may produce its good effects on muscles by increasing the circulation in the stimulated muscles. A sustained increase in blood flow during stimulation suggests a basis for the prevention of atrophy of denervated muscles. From the data obtained on the frequencies of stimulation used in this study, it is evident that the number of stimuli applied per second had an important influence on the circulation and presumably on the therapeutic results in the prevention of atrophy. The following explanation may provide the basis for the difference in effect of the various frequencies used. If the number of stimuli going into the muscle, whether directly or along its nerve supply, is less than 8 per second the contractions of the muscle are so few during the period of stimulation that they are inadequate mechanically to bring about sufficient increases in blood flow to produce optimal therapeutic effects. On the other hand, if the number of stimuli sent to the muscles is more than 32 per second, the periods of maintained contraction occupied by the contraction phases during every minute are of sufficient duration to interfere mechanically with flow of blood into the contracted muscles; consequently higher frequencies produce lesser increases in blood flow through muscles. In addition, the element of fatigue arising during the higher frequencies of stimulation also contributes to the reduction in magnitude of the rise in blood flow during stimulation at those frequencies. Such an evaluation provides a sound basis for selecting an optimal frequency which is most appropriate for use in the therapy of denervated muscle by electric stimulation.

Anrep and associates[10] reported great reduction or even complete arrest of arterial inflow into muscles during tetanic stimulation of the motor nerves, but that the blood flow into the muscles increased between contractions.

In a previous report[10] we concluded that the increase of blood flow in the stimulated extremities was due to the activation of the muscles, because the extremities in which muscles did not contract during stimulation showed no increase in blood flow. The findings suggested that atrophied muscles which do not contract on electric stimulation usually do not develop an increase in blood flow. Evidently, in order for electric stimulation to produce an increase in the circulation of paralyzed muscles, the muscles must be capable of contracting in response to stimulation.

Summary and Conclusions

A study of the influence of varying the frequency of electric stimulation on the blood flow in the stimulated extremity was made on dogs that were anesthetized with pentobarbital sodium. Electric stimulation was transmitted by the active electrode percutaneously in one group and directly along the sciatic and femoral nerves in the other. The frequency of stimuli ranged from 4 to 256 per second. The intensity was the same for all frequencies and was fixed at a point which gave the most vigorous response of the stimulated extremity. The frequency of 16 stimuli per second most often gave the highest increases in blood flow even though 8 and 32 gave sufficiently high results. In most of the observations in which the blood flow was studied in the unstimulated extremity during stimulation of the contralateral limb, there was decrease in blood flow as compared with the control values for that limb. If the increase in blood flow could be considered the basis for the beneficial effects

of electric stimulation of muscles, a frequency of about 16 stimuli per second can be considered optimal.

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Discussion

Dr. Herbert W. Park (Fishersville, Va.): This is a concise, well written paper on the influence of the frequency of muscle stimulation on the rate of blood flow in the stimulated part. The methods used in making the observations are standard acceptable procedures, and Dr. Wakim's analysis as to why 16 stimuli per second caused the highest increase in blood flow is plausible.

I would like to call attention to two points. When any barbiturate is used as an anesthetic rather dramatic changes in blood flow can occur. This drug has a depressing effect both centrally on the vasomotor centers and locally on smooth muscle. If other anesthetics (such as a morphine—chloralose urethane mixture) were used, the change in rate of blood flow would not be as great. Studies done by Eccles, Solandt, and Wehrmacher indicate that there is little or no correlation between the duration of the period of stimulation and the prevention of muscle atrophy. Therefore, it would appear to this observer that prevention of muscle atrophy by electrical stimulation is the result of metabolic properties intrinsic within muscle tissue, and change in rate of blood flow has no direct effect. It would be interesting to see studies done in which rate of blood flow is controlled and its effect on muscle bulk is observed.

EFFECT OF IMMOBILIZATION ON MUSCULAR ATROPHY AND BLOOD FLOW*

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and
H. M. HINES, Ph.D.
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Immobilization of a limb has been shown by numerous investigators to result in atrophy in the affected muscles. However, lack of agreement exists between the findings of different workers as to the effect of fixation in different positions upon muscle mass. Solandt, Partridge and Hunter[1] observed that immobilization of the hind limb of rats resulted in atrophy almost as rapid as that following denervation. Ralston, Feinstein and Inman[2] found in studies on guinea pigs that immobilization in the shortened position was conducive to atrophy, whereas fixation in the stretched position protected against atrophy of disuse. Eisenhauer and Key[3] found moderate and persistent atrophy in the muscles of cats which had been immobilized in the stretched position, whereas little consistent effect was found when the muscles were immobilized in shortened and in neutral positions. Summers and Hines[4] found in studies on cats that immobilization in either the neutral, shortened or stretched position resulted in atrophy and strength loss of the gastrocnemius and soleus muscles. The extent of atrophy was greatest in muscles immobilized in the shortened position and least in the stretched or extended position. It is believed that the controversial findings are due to differences in species, the extent to which the immobilization permitted weight bearing and to the extent to which the cast allowed for muscle movement and to which it served to impede blood flow. Many comments have appeared in the literature concerning damages to the circulation which may result from mal-fitted casts. Most of the observations have been limited to changes in the superficial tissues and little is known about the effect of immobilization upon the blood flow in the deeper tissues. This report deals with the effects of immobilization of the hind limbs of dogs in shortened and in stretched positions upon muscle weight and volume of blood flow. The amount of atrophy resulting from immobilization was compared with that following denervation.

Methods

All experiments were carried out on adult dogs. A contoured cast made from crenoline cloth impregnated with plaster was fitted to the experimental limb from midthigh to midtarsal region while the animal was under pentobarbital (Nembutal®) sodium anesthesia. The stretched or lengthened position was obtained by dorsiflexion at the tibiotarsal joint combined with extension of the knee joint. Limbs were immobilized in the shortened position by full extension of the tibiotarsal joint or plantar flexion aided by knee joint action. The normal contralateral limb served as a control in all experiments. After fourteen days of immobilization, measurements of volume blood flow were made through the femoral arteries of the immobilized and contralateral control limbs with an electromagnetic flow meter[5]. The cannulae were placed in such position in the artery as to record flow through structures at and below the level of the knee. Simultaneous measurements were made of volume blood flow through the artery of the immobilized limb before and after removal of the cast and in the artery of the contralateral control limb. In other experiments simultaneous blood flow measurements were made on normal right and left hind limbs in order to establish the validity of contralateral controls. Measurements were also made

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of the temperatures in the gastrocnemius muscle of the immobilized and of the control limb[8]. In order to compare the amount of atrophy resulting from immobilization with that resulting from denervation, six animals were subjected to a unilateral denervation of the hind limb by sectioning the sciatic nerve at the level of the trochanter and by cutting the femoral nerve at the ligament of Poupart. In all experiments the animals were sacrificed at the end of fourteen days, the gastrocnemius muscles were dissected out and their wet weights determined.

Results

The validity of employing the contralateral limb as a control was established by the finding of no significant difference between either the volume blood flow or weights of the gastrocnemius muscles in the two hind limbs of dogs (table 1). Hence blood flow and weight changes are expressed as per cent of control and each animal served as its own control in the statistical analysis. Variance of the differences was calculated to determine whether significant changes in blood flow and muscle weights were produced. The "null" hypothesis† was rejected at the two per cent level.

Table 1. — Volume Blood Flow Through the Femoral Artery of Normal Right and Left Hind Limbs of Dogs

Animal Number	Right Limb cc./min.	Left Limb cc./min.
1	20	20
2	32	35
3	28	30
4	45	45
5	40	40
6	20	20
7	22	23
8	34	30
9	28	30
10	32	34
11	35	38
Mean	30	31
S.D.	8	8
t	0.25	
Level of Significance	80%	

The data summarized in figure 1 show that immobilization of a hind limb was

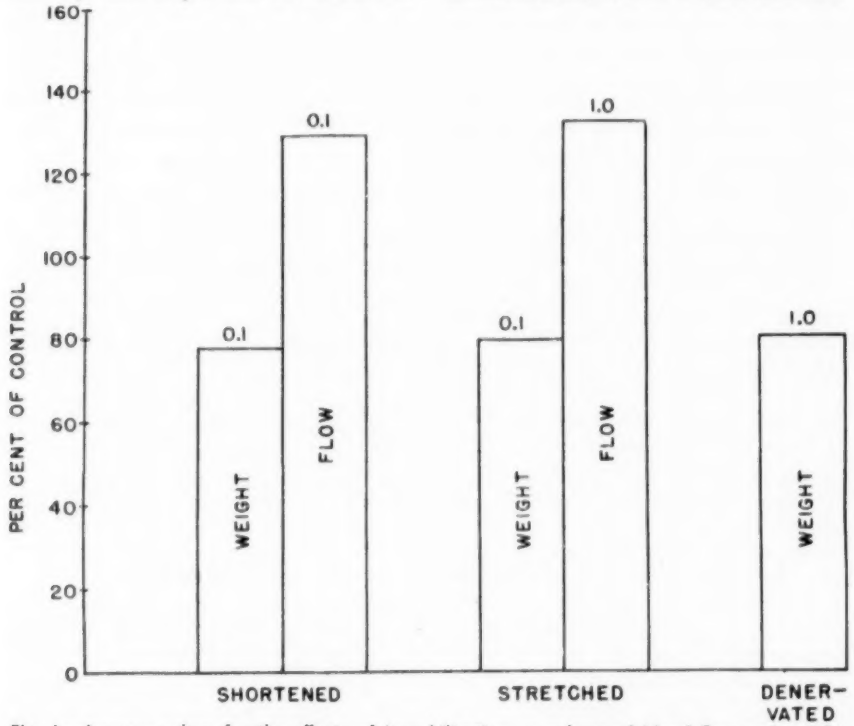

Fig. 1—Average values for the effects of immobilization on volume of blood flow and weight gastrocnemii. The levels of significance are indicated at the top of the bars.

†See Moore et al. Statistics for Medical Students, New York, Blakiston Co., 1951, p. 36.

accompanied by a significant increase in volume of blood flow through the femoral artery. The magnitude of the increase in blood flow resulting from immobilization was approximately the same in both the shortened and stretched positions. The increase in volume flow persisted after removal of the cast. The amount of atrophy which occurred in the gastrocnemius muscle during immobilization in either the stretched or shortened position for fourteen days was comparable to that found at an equal time after denervation. Temperatures in the gastrocnemius muscles under the casts averaged 0.5 C. higher than those in their contralateral controls.

Discussion

Muscular atrophy which occurs during immobilization has been ascribed to disuse, in that active tension development soon ceases after fixation and the muscles usually remain flaccid and apparently toneless[1]. The finding that the amount of atrophy occurring during immobilization was equivalent to that during denervation suggests that the amount of inactivity brought on by immobilization was comparable to that following denervation, which perhaps affords conditions conducive to maximal rates of atrophy.

The finding of an increased blood flow during immobilization is evidence against ischemia contributing to the genesis of atrophy. It should be pointed out that the small but significant increase in blood flow would be even greater if expressed in terms of equivalent weights of tissue in control and atrophic limbs. In previous experiments[2] it was found that the volume of blood flow through the femoral artery was only slightly reduced by removal of the skin from the limb and replacing it with a coat of paraffin. This is taken to indicate that the blood flow as measured was chiefly through the deeper structures. In our experiments it was not possible to determine the extent, if any, the presence of a cast had upon the redistribution of blood flow through collateral channels or to determine what proportion of the increased flow traversed through arteriovenous shunts rather than capillary networks. The increase in temperature of muscle under the cast was not of sufficient magnitude to cause an appreciable increase in blood flow per se[2]. It is entirely possible that the inactivity of skeletal muscle during immobilization is associated with a concomitant abaitment of vasoconstrictor tone. Possible effects on blood flow of a loss of compression of the intramuscular vessels by contracting skeletal muscle fibers must also be considered. In previous studies it was found that denervation of a limb was followed by an immediate increase in the volume of blood flow, which returned to approximately normal values within a period of two weeks[2]. At this time the extent of atrophy was comparable to that following an equal period of immobilization. Recovery from the initial effects of denervation on blood flow has been ascribed to the sensitization of peripheral vasomotor structures to circulating vasoconstrictor hormones. However, sensitization of peripheral structures to circulating humoral agents would not be expected to occur during immobilization.

Summary

Studies were made concerning the effects of immobilizing the hind limbs of dogs in shortened and in stretched positions upon muscle weight and volume of blood flow. It was found that similar increases in blood flow resulted from immobilization in either the shortened or stretched position. The amount of atrophy which occurred in the gastrocnemius muscle during immobilization in either the stretched or shortened position for fourteen days was comparable to that found at an equal time after denervation.

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REHABILITATION OF THE HAND IN RHEUMATOID ARTHRITIS

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In my experience with patients having rheumatoid arthritis I have felt that the hand in particular has received very casual attention. In attempts to regain motion and function, exercises have been permitted without sufficient consideration of the anatomy of the hand. Only recently Rose and Kendall[1] have published a paper discussing the rehabilitation of the hand and giving the same reason for discussion.

Functional Anatomy of the Hand

If permitted to follow the routine pattern seen in rheumatoid arthritis, the metacarpophalangeal joints gradually flex, reaching a stage at which they cannot be actively extended and the fingers may swing toward the ulnar side as flexion occurs. The proximal interphalangeal joints tend to hyperextend and the distal to flex. The reason for this lies primarily in the anatomy of the dorsal aponeurosis of the metacarpophalangeal joint with its muscular insertions and its extension to the interphalangeal joints.

The dorsal aponeurosis of the metacarpophalangeal and interphalangeal joints, is responsible for the coordination of the long extensor and flexors, the lumbricales and the interossei to permit complete smooth motion of flexion and extension of the fingers. The extensor digitorum communis approaches the metacarpophalangeal joint, its fibers spreading transversely into the aponeurosis. One band inserts into the base of the first phalanx. As a part of the aponeurosis it then divides into three slips, the central one passing to insert into the base of the second phalanx while the two lateral slips fuse with the lateral bands to extend the distal joint.

The aponeurosis is separated from the metacarpophalangeal joint by a bursa, but at the interphalangeal joints the aponeurosis is inseparable from the capsule of the joint. At the metacarpophalangeal joint, the thickest portion of the aponeurotic sleeve can shift at least 7 mm., moving from a position directly over the joint to one directly over the proximal end of the phalanx. The fibers of this thickened moving portion run transversely, receiving the insertions of the conjoined tendons of the lumbricales and interossei. When the extensor digitorum communis is relaxed the sleeve moves forward onto the phalanx and the intrinsic muscles contracting flex the metacarpophalangeal joint. When the long extensor pulls the sleeve proximally over the joint extending it, the intrinsic muscles contracting will extend the two interphalangeal joints through the longitudinal fibers of the aponeurosis. Or, with the first joint stabilized by

*Read at the Thirtieth Annual Session of the American Congress of Physical Medicine, New York, N. Y., August 26, 1952.

the long extensor the intrinsic muscles can move the digit laterally. The interosseous muscles have independent slips to the base of the first phalanx on the lateral surfaces which assist in the lateral flexion.

The extension of the interphalangeal joints by the interossei and lumbricales is strong when the proximal joint is straight or hyperextended: but as it flexes toward 45 degrees, the action of the intrinsic muscles becomes less and beyond 45 degrees it becomes negligible. As the proximal joint flexes, the long extensor gradually takes over the extension of the interphalangeal joints and its maximum action is reached when the proximal joint is three-fourths flexed; from that point it recedes particularly in the distal joint.[2]

Formation of Deformities

The most common sequence of deformities seen in the hand as a result of rheumatoid arthritis is that in which flexion occurs at the metacarpophalangeal joints, frequently with ulnar deviation, with hyperextension at the proximal interphalangeal joints, followed by flexion at the distal interphalangeal joints. When the disease is in its very early stage, before any pain or swelling may be noted in the hand, we often note hyperflexibility of the joints with a definite tendency to hyperextension of the second joints. The possible future picture of the hand should be borne in mind even at this early stage. Commonly one notes evidences of synovitis, i.e., the thickening of the capsules and the definite increase in fluid. Pain causes guarding by the flexors. The metacarpophalangeal joint becomes particularly vulnerable. The capsule becomes stretched and the aponeurosis with its multiple muscular attachments is thrown out of line. The normal pull of the extensor digitorum communis is seriously disturbed. This is of great importance in both extension and flexion of the hand. The distended capsule allows the proximal phalanx to subluxate, so that as extension is attempted it may lock upon the volar surface of the metacarpal, or so disturb the pull of the tendon of the extensor upon the proximal margin of the first phalanx that it cannot completely extend the joint. If this joint does not fully extend then the contraction by extensor digitorum communis is forced upon the second joint hyperextending it and upon the distal joint which tends to flex. If this is not arrested the metacarpophalangeal joint can become completely subluxated and the routine contractures of the palmar tissue will follow.

When flexion of all joints is desired, the first joint is already in flexion, and therefore the correct rhythm of flexion is lost. The long flexors normally flex the interphalangeal joints while the long extensor stabilizes the first joint in full extension. If the first joint is already in flexion, and the aponeurosis is forward in the position which permits the contracting intrinsic muscles to further increase the flexion of the first joint, the long flexors can only assist in pulling the tips of the fingers against the distal palm, it being impossible to completely flex the interphalangeal joints. In this position almost no forced flexion can be permitted in the distal joint and a firm grasp is impossible. The rhythm of movement is lost.

The ulnar deviation which is often present at the metacarpophalangeal joints is apparently due to the stretching of the capsules of these joints which permits deviation by gravity. Routinely the ulnar border of the hand is in the dependent position. The intrinsic muscles may add slightly to the ulnar deviation as the normal pull is stronger toward the ulnar than toward the radial side when the metacarpophalangeal joints are in flexion.

Program of Exercise Planned with Regard to the Aponeurosis and the Rhythmic Action of Muscles

Complete extension of the metacarpophalangeal joints is the starting position for all of the fundamental movements of the digits. Complete extension of the first joint must be obtained so that the dorsal aponeurosis is drawn proximally

Fig. 1—In extension of the fingers, the metacarpophalangeal joints should extend first so that the dorsal aponeuroses are drawn proximally over the joints by Extensor Digitorum Communis.

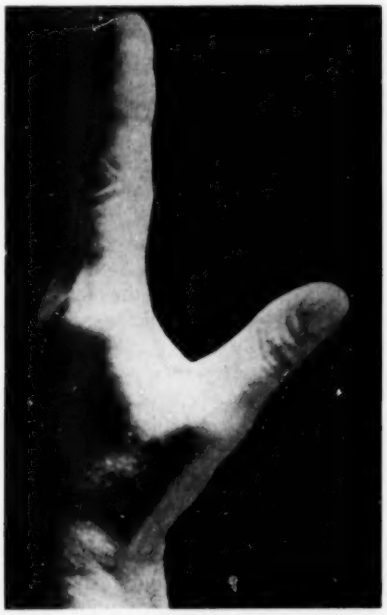

Fig. 2—The interphalangeal joints are then extended by the intrinsic muscles since their insertions into the dorsal aponeuroses have been stabilized.

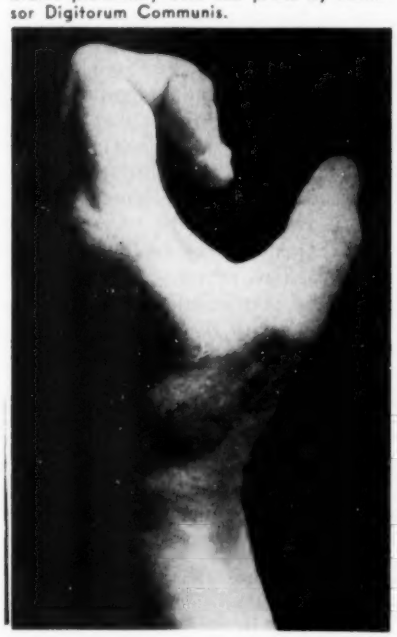

Fig. 3—In flexion of the fingers, the interphalangeal joints should flex first.

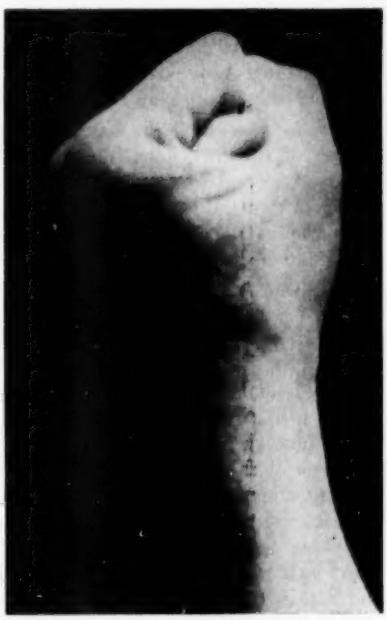

Fig. 4—The metacarpophalangeal joints are then flexed as the dorsal aponeuroses are permitted to slip distally over the bases of the first phalanges where the intrinsic muscles can pull the hand into strong grasp.

before the intrinsic muscles can, through their attachments to it, extend the interphalangeal joints correctly. Full extension of this first joint is necessary to permit the proper direction of pull on the aponeurosis and the first phalanx by the intrinsic muscles, for lateral motion of the digits. The long flexors require extension of the first joint to obtain full flexion of the interphalangeal joints before the aponeurosis is relaxed and the intrinsic muscles pull the metacarpophalangeal joint into flexion to permit a firm grasp.

Treatment starts then with stretch and manipulation of the first joint to get the phalanx into line with the metacarpal. Since the tendency of the interphalangeal joints is to take incorrect alignment when active extension of the first joint is attempted, the second and third joints should remain flexed while the first joint is extending. This extension may need assistance, but resistance must also be applied so that the power of the extensor will be improved and the aponeurosis will be drawn proximally. Active motion may tighten the joint structures as well. Following this, extension of the second and third joints may be obtained and resistance applied to build up the power of the intrinsic muscles.

Likewise in closing the hand, full extension of the first joint must be held until the second and third joints have flexed, so that the tips of the fingers can as nearly as possible contact the base of the fingers before the proximal joint is permitted to flex. Because of hyperextension or loss of cartilage at the proximal interphalangeal joints, flexion is delayed; this makes it doubly necessary to hold the extension of the first joints until the lag in flexion can be overcome. These individual movements are done against manual resistance and then all fingers carry through the range against resistance with the necessary stretching and direction. The rhythm is then: Extend the first joint, then the second and third. Flex the second and third and then flex the first (figs. 1, 2, 3, 4).

Various means can be used to assist in stretching contractures; to hold the metacarpophalangeal joints in alignment while movements are completed; and to afford resistance for the development of power. Rose and Kendall discuss the value of finger painting as a means of stretching the palmar contractures; they also described other occupational means for improving function. The assistance of a physical therapist is of great value in obtaining the best possible alignment and function. No apparatus can replace the directed movement of an experienced operator. The hand is so important that the time and cost should have secondary consideration. A member of the family can be trained to assist with the home program. The patient can be taught sufficient anatomy to make occupations in the home take on functional value in order that incorrect positions and movements can be avoided and that correct ones can assist in decreasing deformity and increasing power.

Summary

1. The dorsal aponeurosis of the metacarpophalangeal joint is a key structure in the functional anatomy of the hand. It receives the insertions of the extensor digitorum communis and the intrinsic muscles and its position determines the motion of the fingers.

2. Extension of the metacarpophalangeal joints is the starting point for most movements of the hand.

3. Extension of the metacarpophalangeal joints must be obtained and maintained to prevent deformities and retain the best function in the hand of the patient with rheumatoid arthritis.

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Discussion

Dr. Donald L. Rose (Kansas City,

Kansas): Hand disabilities seen as a part of the several syndromes of rheumatic diseases many times constitute more actual crippling dysfunction than any other combination of musculoskeletal involvement in these diseases. It is quite remarkable that so little specific attention has been paid either to the actual salvage of hand disabilities or to a well planned and consistently followed out long-range program for the prevention of such disabilities. Dr. Baker has correctly directed attention to the aponeurotic and other fibrous tissue structures which in the final analysis, through muscle tensions, make hand function possible.

May I presume to reemphasize two aspects of Dr. Baker's paper. First is the matter of muscle weakness. I believe that the commonly attributed weakness of the intrinsic muscles of the hand as explaining the basis for the disability is fallacious. Weakness is present in all muscles, not necessarily more in the intrinsics. In fact one of the earliest signs of rheumatoid arthritis is objectively demonstrable general muscle weakness. Such weakness may not even be subjective. We have used the simple grip dynamometer in our arthritis clinic as a rough screening test and by such means have repeatedly seen as much as 50 per cent reduction in grip without pain or even any subjective awareness on the part of the patient that there was diminution in strength.

The second point to be emphasized is the hyperflexibility of the joints. This is a fibrous tissue defect and permits joint actions without the normal snugness of the structures which support the joint and make possible the precise articulations which enable movements to occur efficiently and painlessly. It is difficult to separate those factors concerned with the specific disease itself and those mechanical factors which have nothing to do with the disease process as such. The clinical syndrome is certainly the sum of all factors however non-related.

Thirdly, I find myself in some disagreement with Dr. Baker. I doubt sincerely the rational existence of an exercise program. Certainly not all patients show flexion at the M-P joints; many show hyperextension, at least early in the course of the disease. To have hyperextension of the M-P joints as a routine part of the exercise program will do nothing but aggravate the deformity in those patients in whom hyperextension already exists. There cannot be any disagreement as to the need for correction of muscle and articulatory imbalances, but corrective measures will necessarily hinge on the imbalances presented in the individual case. In those cases in which there is this odd exaggeration of capsular flexibility, perhaps an exercise program will achieve the undesirable result of aiding joint subluxation through increased mechanical stress on hyperflexible joints.

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to plan for your Annual Meeting,

Chicago, August 31 - Sept. 4, 1953

Modified Parallel Bars For Restricted Space*

HERBERT KENT, M.D.[1]
E. L. MARTINSON, B.S.[2]
and
ELMER R. GANZA, B.S.[3]
INDIANAPOLIS, INDIANA

Improvised apparatus to suit the special needs of patients undergoing Physical Medicine and Rehabilitation therapy is of particular importance in the establishment and equipping of a complete department of Physical Medicine and Rehabilitation where floor space is at a premium. A modified parallel bar which has proved extremely useful in our facility is described.

*Sponsored by the Veterans Administration and published with the approval of the Deans Committee. The statements and conclusions published by the authors are a result of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

1. Chief, Physical Medicine Rehabilitation;
2. Assistant Manager;
3. Assistant Chief, Exercise Therapy, Veterans Administration Hospital, Indianapolis, Indiana.

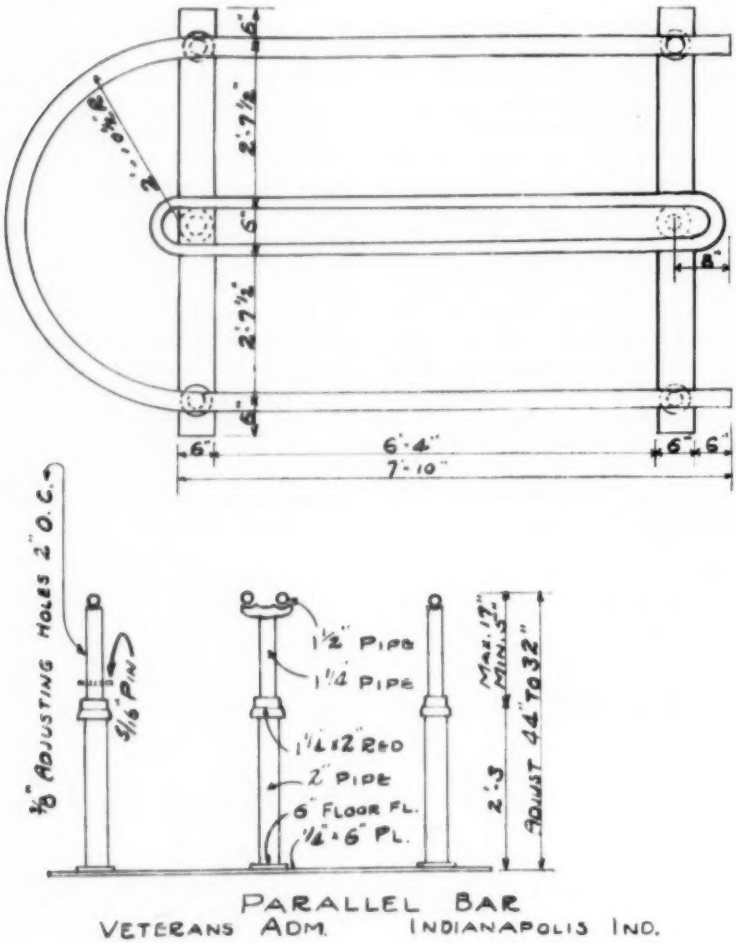

Fig. 1 — Structural specifications for parallel bar.

DESCRIPTION: These parallel bars are constructed of piping and tubing as indicated in the diagram, figure 1. Welding of the base plates to the upright posts provides a rigid structure permitting the entire apparatus to be moved along the floor with a minimum of difficulty. The height can be adjusted for patients as the need arises by removing the appropriate pins and inserting them into the openings on the hand rail posts, figure 2. A rubber matting can cover the quarter-inch steel plates upon which uprights are attached, thus preventing toe-catching.

PURPOSE AND USE: This apparatus is suitable for restricted areas where parallel bars are needed for the teaching and practicing of ambulation in disabled individuals, for example, paraplegia, hemiplegia, amputee and orthopedic cases. Two patients can practice ambulation at the same time. The length of travel available is about 22 feet. These bars permit instruction in correct posture and gait training when mirrors are used at one end. Group and competitive ambulation also is possible.

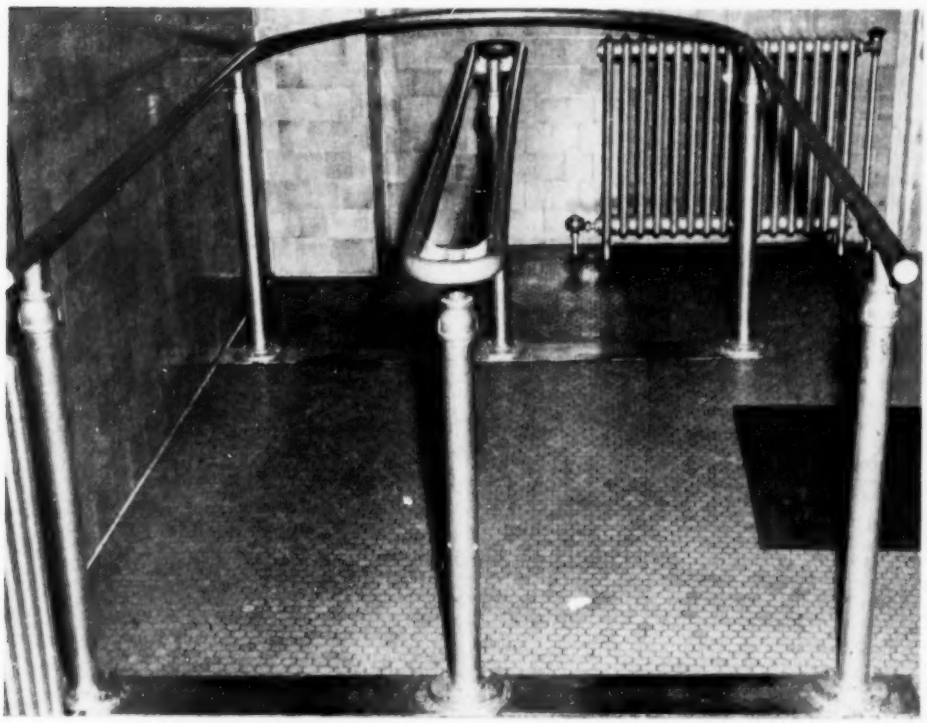

Fig. 2 — Photograph of finished parallel bar.

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EDITORIAL

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION
OFFICIAL JOURNAL

American Congress of Physical Medicine and Rehabilitation
American Society of Physical Medicine and Rehabilitation

OUR HOSPITALS AND REHABILITATION

To belabor further the subject of rehabilitation may seem superfluous repetition. Such is not the case. In spite of all that has been said and written on this topic, there is still a discouragingly large number of managers, executives, and staff members of our non-federal hospitals who are unaware of the modern concept of physical medicine and the growing demand for rehabilitation.

The results of a survey of twenty-eight of the largest and most active general hospitals out of a total of fifty-one in a great metropolitan area confirm this statement. An inquiry was carried out under the auspices of a local welfare group by a highly qualified investigator. Data were obtained by informal personal interview, not through a questionnaire. This survey shows that about one-half of the institutions considered maintain some sort of an organized department that furnishes at least physical therapy, in which one or more occupational therapists and/or physical therapists are employed. For the most part, these departments are under the part-time supervision of a physician who rarely has been trained as a physiatrist. Only six of the group considered maintained fully organized departments of physical medicine, in several of which properly integrated programs of rehabilitation have been developed with more or less success. Only one institution boasts of the services of a speech therapist. In all fairness, it must be said that a number of hospitals are giving serious consideration to the possibility of establishing departments of physical medicine and rehabilitation. There are several in the process of expansion which have prepared definite plans to carry on such activities. The above findings are not peculiar to the area under discussion. Similar investigations in other large urban districts throughout this country will yield results that are equally discouraging.

Interviews, in the course of the survey under consideration, with lay and professional personnel concerned with hospital management, indicate some of the chief causes responsible for the situation. Not a few managers are lacking not so much in interest as in knowledge of the meaning and value of physical medicine and rehabilitation. Hospital administrators are reluctant to initiate or expand rehabilitation programs because of lack of space, increased building costs, the financial burden of maintaining such departments due to the high salaries demanded by registered technical assistants, the inability to obtain qualified professional direction, and

above all, the absence of enthusiasm for and the feeble support of rehabilitation activities by their medical staffs. Several hospital directors admit they have been forced to close existing departments of physical medicine because of the few patients referred to them.

The most important and fundamental reason for the failure of our general hospitals to take a more progressive and active part in the rehabilitation movement is the self-complacence and indifference of physicians in general towards that field of therapy. One prominent surgeon, remarked that since he had successfully practiced surgery for a long time without the aid of rehabilitation techniques, he was disinclined to employ them now. It is certain he would not have advanced such an illogical argument as a defense for not using some of the other procedures that in recent years have improved surgical care. Such comments are not limited to any one hospital division. They emanate too frequently from various hospital services. Hospital administrators who seek to establish departments of physical medicine and rehabilitation are discouraged by the lack of cooperation given their efforts by staff physicians.

Wherever medical boards earnestly recommend the establishment of departments of physical medicine and rehabilitation, because they seriously believe that by so doing patient care is improved and hospital stay shortened, the hospital administrators will find a way to comply with their request. As has been said so often, the future development and widespread employment of physical forms of therapy and a more universal acceptance of the philosophies underlying rehabilitation are squarely the responsibility of the medical profession.

The remedy for the present situation lies in the education of the doctor. To arouse in older physicians enthusiasm for new concepts is admittedly difficult and often unsatisfactory. Hope for the future rests upon the creation of interest in physical medicine and rehabilitation among medical students and recent graduates in medicine. In recognition of this, medical schools are gradually incorporating some teaching of these subjects into their curricula. Federal agencies, notably the Public Health Service, as well as certain foundations, are offering fellowships and scholarships as an inducement to physicians to enter the rehabilitation field. Most recently, several schools of medicine have undertaken to establish elaborate, long range, overall programs of rehabilitation designed to expand the teaching of that subject and to coordinate it with clinical instruction throughout the entire four years' course. Thus, graduates of the future will enter upon the practice of medicine at least aware of the possibilities of rehabilitation and its importance in total patient care.

Those who are responsible for the teaching of physical medicine in our schools will find interest and stimulation from the exceptionally clear discussion of the subject to be found in the lead article of this issue of the *Archives*. The contribution entitled, "Undergraduate Instruction in Physical Medicine and Rehabilitation" is by Dr. Charles A. Doan. As Dean of the School of Medicine of Ohio State University, Dr. Doan speaks from experience and with authority in matters of medical education. His suggestions deserve careful consideration.

All who take a realistic view of the present situation know that much remains to be done in the educational field. Although much has been accomplished, the time is not yet here when we dare relax our efforts to spread the gospel of rehabilitation among medical students, educators, hospital administrators, and above all, among the practicing physicians of this country.

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

PERSONALS

John H. Aldes, M.D., Los Angeles, has been elected to the Advisory Board of the National Board of Multiple Sclerosis; Doctor Aldes has recently been elected a Fellow of the American Academy of Orthopedic Surgeons. — **Frederick J. Balsam,** M.D., Memphis, Tenn., was a recent visitor to the Kessler Institute for Rehabilitation. — **Josephine J. Buchanan,** M.D., Arlington, Va., will be coordinator of the symposium "The Patient, His Evaluation and Program for Rehabilitation" scheduled for the annual meeting of the American Physical Therapy Association. — **Neil Buie,** M.D., Marlin, Texas, participated in the Section on General Practice at the annual meeting of the Texas Medical Association on April 28, 1953. Doctor Buie opened discussion of the paper "Treatment of the Underweight Patient in General Practice." Doctor Buie was elected president of the Marlin Chamber of Commerce and Agriculture at the group's first meeting of 1953. — **Anthony C. Cipollaro,** M.D., New York City, presented the topic "Skin Cancer" on April 9 as part of the New York Academy of Medicine postgraduate radio program. — **Michael M. Dacso,** M.D., New York City, gave the first annual "Michigan Foundation for Medical and Health Education Lecture" before the 1953 Michigan Clinical Institute on March 13, 1953. — **George G. Deaver,** M.D., New York City, was a guest speaker at a cerebral palsy institute held under the sponsorship of the United Cerebral Palsy Association of Los Angeles County and the Childrens Hospital of Los Angeles, on April 1-2, 1953. — **S. G. Feuer,** M.D., Brooklyn, N.Y., will give a lecture at a symposium to be held at the Jewish Sanitarium and Hospital for Chronic Diseases on "Rehabilitation Goals in Pediatrics" on May 8, 1953; on May 29, 1953, Doctor Feuer will read the paper "A Realistic Approach to Rehabilitation in Geriatrics" at the meeting of the American Geriatrics Society.

O. Leonard Huddleston, M.D., Santa Monica, Calif., will speak on "Principles of Neuromuscular Reeducation" at the meeting of the Chicago Society of Physical Medicine and Rehabilitation, May 27, 1953. — **Frederic J. Kottke, M.D.,** Minneapolis, head of the department of physical medicine at the University of Minnesota Hospitals, directed a one-day conference on poliomyelitis at the University Center for Continuation Study, January 15, 1953. — **Madge C. L. McGuinness,** M.D., New York City, is a member of the Board of Associate Editors of the journal MEDICAL TIMES. — **Louis B. Newman,** M.D., Hines, Ill., participated in a discussion on "Injuries of the Spinal Cord and Cauda Equina" at a meeting of the Committee on Trauma of the American College of Surgeons at the VA Hospital, Hines; Doctor Newman also participated in the Section on Cardiovascular Disease at the annual meeting of the Illinois State Medical Society on May 19, 1953, speaking on "Rehabilitation of Cardiacs." — **William H. Northway,** M.D., San Francisco, spoke on "Rehabilitation of the Poliomyelitis Patient" at the 71st course of popular medical lectures at the Stanford University School of Medicine, April 17, 1953. — **Donald L. Rose,** M.D., Kansas City, Kan., addressed a staff conference at the VA Hospital (Crile), Cleveland, March 26, 1953, on "Rehabilitation of Hand Function in Rheumatoid Arthritis." — **Grace M. Roth,** M.D., Rochester, Minn., is co-author of the paper "Familial Pheochromocytoma" scheduled to be read at the annual meeting of the American Heart Association. — **Jacob L. Rudd,** M.D., Boston, is co-author of the article "Teamwork in Medical and Vocational Rehabilitation" appearing in a recent issue of the AMERICAN PRACTITIONER. — **Howard A. Rusk,** M.D., New York City, will discuss various phases of rehabilitation at the annual meeting of the West Virginia State Medical Association; Doctor Rusk has recently been named a delegate to the assembly of the International Society for the Welfare of Cripples as counselor in rehabilitation.

Duane A. Schram, M.D., Gonzales, Texas, sponsored the scientific exhibit "A Physical Medicine and Rehabilitation Hospital" at the annual meeting of the Texas Medical Association held in April. — **Ferdinand F.**

Schwartz, M.D., Birmingham, Ala., participated in the panel "Medicolegal Aspects of Bone Injuries and Possibilities for Rehabilitation" held in conjunction with the Medical Legal Clinic at the University of Alabama, March 28, 1953. — **Oscar O. Selke, Jr.**, M.D., Houston, spoke on "Hemiplegic Problems" at the annual meeting of the Texas Chapter of the American Physical Therapy Association on April 26, 1953. — **Wilbur A. Selle, Ph.D., Los Angeles**, is author of the publication "Body Temperature: Its Changes with Environment, Disease and Therapy."— **Roberto Taliberti, M.D.**, Sao Paulo, Brazil, participated in a course for specialization in physical therapy conducted by the Hospital das Clinicas of the College of Medicine, Sao Paulo University.—**Odon F. von Werssowetz, M.D.**, Nashville, Tenn., presented a paper "The Value of Offset Hinge Braces in Rehabilitation of Neuromuscular Disorders" before the Nashville Academy of Medicine and the Davidson County Medical Society, March 10, 1953. — **Edwin C. Welsh, M.D.**, Milwaukee, Wis., presented a paper "Rehabilitation of the Hemiplegic Patient" at the February 17, 1953, meeting of the Milwaukee Academy of Medicine. Doctor Welsh's essay won first prize in the annual Rogers Memorial Essay Contest. — **Charles S. Wise, M.D.**, Washington, D.C., is author of the article "Physical Therapy in a General Hospital from the Point of View of a Physiatrist" appearing in a recent issue of the PHYSICAL THERAPY REVIEW.

NEW MOTION PICTURES

ON OUR OWN (16 mm., sound, 14 minutes. Produced in cooperation with the New York State Rehabilitation Hospital. Released by National Foundation for Infantile Paralysis). This film shows the latest steps in the rehabilitation of patients with advanced poliomyelitis as practiced at the New York Rehabilitation Institute. It is recommended as a satisfactory exposition of the more advanced methods of physical rehabilitation of the patient who has been seriously disabled by poliomyelitis.

THE DIAGNOSIS OF POLIOMYELITIS (16 mm., sound, 30 minutes. Released by National Foundation for Infantile Paralysis). This film reviews, by means of actual clinical examples, the outstanding symptoms of spinal and bulbar poliomyelitis that should be looked for during the physical examination and presents examples of the conditions with which poliomyelitis is most frequently confused.

FUNTIONAL ANATOMY OF THE HAND (16 mm., sound, color, 28 minutes. Produced by the Department of Anatomy, Duke University, Durham, N.C.) The normal function of the muscles of the hand and forearm as well as the relation of the muscles to the skeletal structure is graphically shown in this film. It is remarkable for the extremely clever dissection enabling the anatomist to work the individual tendons of the wrist and fingers, and for the expert use of a mirror whereby the same movement is viewed from two aspects at once.

SPECIAL COURSE IN CEREBRAL PALSY

A special course in cerebral palsy, limited to physicians only, will be given at the Cook County Graduate School of Medicine, from June 15 through June 26, 1953, under the direction of M. A. Perlstein, M.D., of Chicago. Enrollment in the course is limited, and all applications should be sent directly to the Registrar, Cook County Graduate School of Medicine, 707 S. Wood St., Chicago 12.

BOARD CERTIFICATION CREDIT NOW APPROVED

The American Board of Internal Medicine has approved for credit toward Board certification, one year's training in rehabilitation for residents and fellows, given by the Department of Physical Medicine and Rehabilitation of the New York University College of Medicine. The program is offered at the Institute of Physical Medicine and Rehabilitation of the New York University-Bellevue Medical Center and at other institutions affiliated with the Medical Center.

HALL OF FAME TO BE ESTABLISHED

The International College of Surgeons plans to establish a worldwide Surgeons' Hall of Fame in Chicago. This project was initiated by Dr. Max Thorek, founder and secretary-general of the college. Those honored will be chosen by vote of an electoral college with representatives from every part of the world. Names submitted by national organizations or individuals will be considered.

NEW JOURNAL ON LEUKEMIA AVAILABLE

A new journal, aimed at furthering research on leukemia, will be published monthly under the sponsorship of the Lenore Schwartz Memorial Foundation. The publication consists of abstracts of the world's literature on the subject and is sent free to medical men working in the field of blood diseases, to research workers in this field and to medical libraries all over the world. The journal is compiled, printed and distributed by The John Crerar Library, 86 E. Randolph St., Chicago.

102nd Annual Session American Medical Association

Members of the American Congress of Physical Medicine and Rehabilitation will participate in the 102nd annual session of the American Medical Association, New York, June 1-5, 1953. The following members are serving on committees; Madge C. L. McGuinness, Local Committee on Arrangements and Subcommittee on House of Delegates Dinner; Howard A. Rusk, Subcommittee on House of Delegates Dinner; Anthony Bassler, Subcommittee on Distinguished Guests; Arthur S. Abramson, Hans J. Behrend, Donald A. Covalt, George G. Deaver, and William B. Snow, Subcommittee on Physical Medicine and Rehabilitation.

Anthony C. Cipollaro will open discussion of the paper "The Association of Muco-Cutaneous and Visceral Malignancies," Clair M. Kos will open discussion of the paper "The Fenestration Operation Analyzed for the Nonfenestrating Otologist."

Papers will be presented by Christopher J. McLoughlin, "Diagnostic Significance of Blood Sugar Findings"; Harold Dinken, "The Alleviation of Emotional Problems in Multiple Sclerosis by Group Psychotherapy," and Lenox D. Baker, "The Triceps Surae Syndrome in Cerebral Palsy."

The Section on Physical Medicine and Rehabilitation will meet on Tuesday, June 2, at 9 a.m., in the North Ballroom of the New Yorker Hotel. A panel on Geriatrics will be conducted with Kristian G. Hansson as moderator. Papers to be presented are: "Rehabilitation in General in Geriatrics," Edward J. Lorenze; "Physical Medicine and Rehabilitation for the Elderly Neurologic Patient," Arthur L. Watkins; "Peripheral Vascular Disease in Geriatrics," Charles S. Wise, and "Medical Aspects in Geriatrics," Harold Dinken. On Wednesday, June 3, at 9 a.m., a panel on Arthritis will be conducted with Frank H. Krusen, as moderator. Papers to be presented are: "Classification of Arthritis," Robert M. Stecher; "Rehabilitation in Arthritis," Donald L. Rose; "Surgery in the Rehabilitation of the Arthritic," Lee Ramsay Straub, and "Medication for Arthritis," Richard H. Freyberg. On Thursday, June 4, at 2 p.m., the Section will meet jointly with the Section on Preventive and Industrial Medicine and Public Health. Jessie Wright will present the paper "The Early Treatment of Poliomyelitis" with Duane A. Schram opening the discussion. "Rehabilitation in Poliomyelitis" will be presented by Robert L. Bennett, with Morton Hoberman opening the discussion.

A Special Exhibit on Artificial Respiration will be presented by the Council on Physical Medicine and Rehabilitation of the American Medical Association in cooperation with the American National Red Cross. Frederic T. Jung and Mr. Howard A. Carter, are serving on the Committee in charge of the demonstration.

Congress members will also participate in the various sections of the Scientific Assembly. The exhibits and participants are: Section on Experimental Medicine and Therapeutics, "Phenylbutazone-Butazolidin, A Non-Steroidal Agent for the Treatment of Rheumatic Diseases," Edward W. Lowman; "The Role of the Plethysmogram in the Management of Peripheral Vascular Disease," Wilbur A. Selle; Section on Obstetrics and Gynecology, "Marriage Counseling," A. P. Hudgins. The Section on Physical Medicine and Rehabilitation has scheduled the following scientific exhibits — "Rehabilitation Procedures for Children with Physical Disabilities," Howard A. Rusk, Georgé G. Deaver, and W. Kenneth Lane; "Sheltered Employment," Lawrence Linck and Jayne Shover; "Dynamic Exercises for Lower Extremity Amputees," Otto Eisert and Owen Tester; "Assets and Deficits in Rehabilitation in Chronic Rheumatoid Arthritis," Edward W. Lowman and Philip R. Lee; "Early Treatment of Patients with Spinal Cord Injury," Donald A. Covalt and Irving S. Cooper; "Exercising Devices," William Bierman; "Cellular Energy Mechanism," L. Corsan Reid and Howard A. Rusk, and "Procedures and Goals in Comprehensive Rehabilitation," Robert C. Darling and Edward E. Gordon.

The officers of the Section on Physical Medicine and Rehabilitation are: Chairman, Kristian G. Hansson, New York; Vice Chairman, Walter M. Solomon, Cleveland; Secretary, Walter J. Zeiter, Cleveland; Delegate, Frank H. Krusen, Rochester, Minn.; Representative to Scientific Exhibit, Arthur L. Watkins, Boston; Executive Committee, George Morris Piersol, Philadelphia; Howard A. Rusk, New York; Dr. Hansson; Dr. Zeiter, and Dr. Krusen.

GERIATRICS SOCIETY TO MEET

The American Geriatrics Society will hold its annual meeting at the Hotel Commodore, New York City, May 28-30, 1953. For complete information, write the Secretary, Malford W. Thewlis, M.D., 25 Mechanic St., Wakefield, R.I.

FORMER PHYSICAL THERAPIST NOW COMMISSIONED MEDICAL OFFICER

Fae M. Adams, M.D., became the first woman physician commissioned in the U. S. Regular Army, Lt. Adams will report to Walter Reed Army Hospital in Washington, D.C., to begin residency training on July 1. Lt. Adams served as a commissioned physical therapist during World War II.

A LETTER TO THE EDITOR . . .

The following letter was directed to the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

Dear Sir,

In perusing the current literature with which this journal is concerned, we note that an ever increasing number of its articles deals with problems pertaining to research on "stress" and the so-called "adaptive hormones" (ACTH, STH, corticoids, adrenergic substances, etc.).

We are writing you because, in our opinion, the success of research in this complex and rapidly developing field largely depends upon the prompt availability and evaluation of relevant publications, a task for which we should like to solicit the assistance of your readers.

In 1950, our Institute has initiated the publication of a series of reference volumes entitled "Annual Reports on Stress" (Acta Medical Publishers, Montreal) in which the entire current world literature is surveyed every year (usually between 2000 and 4000 publications). Up to now, we had to compile the pertinent literature partly from medical periodicals, monographs, abstract journals and partly from reprints sent to us by the authors themselves. Of all these, reprints proved to be the best source of data which we felt deserved prompt attention in our annual reports. Hence, in the past, we have sent out several thousand individual reprint requests to authors of whom we knew that they are currently engaged in research on stress and allied topics. Even this procedure did not give us the wide coverage which would be desirable, because it is materially impossible to contact all these authors individually and it often takes too much time to get the requested reprints.

It is evident that in order to insure prompt inclusion of publications in the annual reports, these surveys must develop into a co-operative effort between the authors of original papers and the reviewers. This co-operation was greatly enhanced of late by the publication of announcements in several medical journals, encouraging investigators interested in stress research to send us their reprints for this purpose as soon as they become available.

We should be grateful if by the publication of this note, you would also bring this problem to the attention of your readers.

We are Sir,

Very sincerely yours,

HANS SELYE,

M.D., Ph.D., D.Sc., F.R.S.(C), Professor and Director of the Institute of Experimental Medicine and Surgery, University of Montreal

RHEUMATISM MEETING SCHEDULED

The American Rheumatism Association will hold its annual meeting at the Waldorf-Astoria, New York City, May 28 and 29, 1953. The Secretary of the Association is William H. Kammerer, M.D., 33 E. 61st St., New York City.

PROGRAM DIRECTOR APPOINTED

Doctor Phyllis F. Bartelme has been appointed to head an extended program of research into the care, treatment and training of cerebral palsied children at Blythedale, Valhalla, New York. The new study will consider both medical and non-medical factors in the care and rehabilitation of cerebral palsied children and will be carried out under a grant from the Association for the Aid of Crippled Children.

PHYSICAL MEDICINE SOCIETY MEETS

At the regular meeting of the New England Society of Physical Medicine, Wednesday, April 15, 1953, Arthur A. Thibodeau, M.D., presented the subject "The Evaluation and Treatment of a Patient with Low Back Pain." Dr. Thibodeau is Chief of Orthopedic Surgery at the New England Center Hospital and Associate Professor of Orthopedic Surgery at Tufts Medical School.

GRANT TO REHABILITATION CENTER

New York University-Bellevue Medical Center has received a March of Dimes grant of $23,145 to continue its reference center for information on appliances for handicapped persons. The center has distributed loose-leaf manuals on self-help aids to hospitals, agencies, and professional persons concerned with the welfare of the handicapped.

CALIFORNIA SOCIETY MEETS

At the March 26, 1953 meeting of the Southern California Society of Physical Medicine and Rehabilitation, Joseph C. Risser, M.D., discussed "Scoliosis, Cause and Treatment."

MOTION PICTURE REVIEWS AVAILABLE

The fourth supplement to the booklet entitled "Reviews of Medical Motion Pictures" was published recently by the Committee on Medical Motion Pictures of the American Medical Association. Copies may be requested from the committee, American Medical Association, 535 N. Dearborn St., Chicago 10.

JOINT MEETING TO BE HELD

On Saturday, May 16, 1953, the Pennsylvania Academy of Physical Medicine and the New Jersey Society of Physical Medicine will meet jointly at the Philadelphia General Hospital, 34th Street and Curie Avenue, Philadelphia. The following program is scheduled:

1:00 P.M. Inspection of facilities of the Department of Physical Medi- and Rehabilitation, Philadelphia General Hospital—Dr. Albert A. Martucci and staff.

2:30 P.M. Dr. William Erdman II, Philadelphia.—Prosthesis in Amputation. (Demonstration)

3:00 P.M. Dr. George Farrar, Philadelphia. —Hyaluronidase as an aid to increasing joint functions. (Film)

3:30 P.M. Dr. Temple Fay, Philadelphia.—The value of unlocking reflexes in spastic type of paralysis.

4:00 P.M. Dr. J. M. Johnston, Pittsburgh. —Film on Treatment and Rehabilitation of Muscular Dystrophy.

4:30 P.M. Dr. Harold Lefkoe, Philadelphia. —Intermittent Cervical Traction. (Demonstration)

5:00 P.M. Discussion

6:00 P.M. Cocktails—Penn-Sheraton Hotel, 39th and Chestnut Streets, Philadelphia.

6:30 P.M. Dinner—Penn-Sheraton Hotel.

Please mail reservations to Mrs. M. Van Benschoten, Department of Physical Medicine and Rehabilitation, Philadelphia General Hospital, Philadelphia 4, Pa.

SOCIETY OPENS NEW REHABILITATION CENTER

Under the sponsorship of the New Hampshire Society of Crippled Children and Handicapped Persons, the Crotched Mountain Rehabilitation Center was opened. Priority will be given to New Hampshire children who are unable to pay; non-residents are expected to pay, although the Society hopes to extend the non-paying privilege to all when funds are available.

AUTORADIOGRAPHY COURSE

An advanced course in autoradiography and three basic courses in radioisotope techniques are course offerings of interest to medical and biological personnel planned this spring and summer by the Special Training Division of the Oak Ridge Institute of Nuclear Studies. The autoradiography course whil be held from June 15-25, and basic courses of four weeks' duration will begin on June 8, July 6, and August 10.

Application forms and additional information may be obtained from the Special Training Division, Oak Ridge Institute of Nuclear Studies, PO Box 117, Oak Ridge, Tenn.

CONGRESS MEMBERS PARTICIPATE IN ANNUAL MEETING OF AMERICAN COLLEGE OF PHYSICIANS

The following papers were presented by Congress members at the 34th annual session of the American College of Physicians, April 13-17, 1953, at Atlantic City: "Intra-articular Hydrocortisone in the Treatment of Arthritis," Joseph L. Hollander, Philadelphia; "Rehabilitation," Howard A. Rusk, New York City, and "Physical Medicine and Rheumatology," Walter M. Solomon, Cleveland. Doctors Howard A. Rusk, Joseph G. Benton, Donald A. Covalt, George G. Deaver, Edward A. Lowman, and Morton Marks participated in a panel on "Rehabilitation." A film "Occupational Health" directed by S. G. Feuer, Brooklyn, and containing a section on rehabilitation of the injured worker was shown at the meeting.

Newly Registered Therapists

March 6, 1953

Case, Doris June, 28 B St., Lemoore, Calif.

Dennison, Patricia Ann, 720 Royal St., Alton, Ill.

Mammen, Sally Ann, 603 N. Sixth St., Vandalia, Ill.

Martin, Rosemary, 233 N. Vandeventer, St. Louis, Mo.

Palmer, Robert Francis, 1913A Academy Pl., Glendale, Calif.

Walker, Helen Ann, 1642 Eastern Pkwy., Louisville, Ky.

March 10, 1953

Fisher, Alvin Lee, 312 N. Boyle Ave., Los Angeles 33, Calif.

March 13, 1953

Coulston, Edward Thomas, 610 Wayne Ave., Dallas, Tex.

Ferree, John Thomas, R. #2, Campbellsburg, Ind.

March 16, 1953

Carpenter, Cynthia Ann, 13 Lenox Pl., Middletown, N.Y.

Clarke, Mary Drexler, Bay and Summit Aves., Island Heights, N.J.

Constas, Catherine Ernest, 65 St. Gregory St., Dorchester, Mass.

Fairman, Marilyn Dorothy, 25 Coolidge Rd., Springfield, Vt.

Flaxman, Marion Mae, 10 Edgar Ct., Somerville, Mass.

Griffith, John Elmer, 1006 N. Eastman Ave., City Terr., Los Angeles, Calif.
Haag, Charles M., VA Hospital, Chillicothe, Ohio
Hedrick, John F., 312 N. Boyle Ave., Los Angeles 33, Calif.
Hopkins, Lucy Jane, Hopkins Lane, Orleans, Mass.
Mann, Genevieve Cornelia, Waterville, Vt.
Murphy, Marilyn Terese, 56 Jackson Ave., Rutland, Vt.
Slattery, Marion Eleanor, 1125 Massachusetts Ave., Arlington 74, Mass.
Thompson, Elizabeth, 78 Pilgrim Rd., Boston, Mass.
Washburn, Evelyn Mary, 9 Pearl St., Philadelphia, N.Y.
Wolcott, Lillian Beatrice, 86 Smull Ave., West Caldwell, N.J.

March 20, 1953

Longfellow, Rodney Vail, 2700 E. Eighth St., Los Angeles 23, Calif.
McHenry, John Richard, 2835 N. 41st St., Kansas City, Kan.
Pruett, Estol C., 416 N. Boyle Ave., Los Angeles 33, Calif.

March 30, 1953

Holt, Helen Susan, c/o Eliz. Kenny Inst., 1800 Chicago Ave., Minneapolis 4, Minn.
Thomas, Charles Samuel, 312 N. Boyle Ave., Los Angeles, Calif.

April 7, 1953

Marx, Melvin George, Harvard, Neb.

April 14, 1953

Cerbulis, Anna Dombrovskis, 2848 N. Park Ave., Philadelphia 32, Pa.
Figgatt, Sallie I., 559 Weymouth Rd., Springfield, Pa.
Glass, Alvin, 4329 Park Hts. Ave., Baltimore 15, Md.
Jackson, Jacqueline E., Woodstock, N.Y.
Kober, Gordon Alvin, 175 North Ave., Webster, N.Y.
Olufs, Robert John, 3828 N. Central Park Ave., Chicago 18, Ill.
Shinehouse, Elfreda Jane, South Seaville, N.J.
White, Donna Marie, c/o Mrs. J. W. O'Donnell, 116 Wayne Pl. S. E., Washington 20, D.C.

BE SURE **to attend the meeting of the CHICAGO SOCIETY OF PHYSICAL MEDICINE AND REHABILITATION, Wednesday, May 27, 1953. Dr. O. Leonard Huddleston of Santa Monica, California, will speak on "Principles of Neuromuscular Reeducation." Complete details may be had by writing Joseph Koczur, M.D., 319 Minocqua, Park Forest, Illinois.**

31st Annual Session

SCIENTIFIC EXHIBIT SPACE

Requests for applications for scientific exhibit space in connection with the 31st Annual Session to be held at The Palmer House, Chicago, August 31 through September 4, 1953, are being received. Address all communications to the American Congress of Physical Medicine and Rehabilitation, 30 North Michigan Avenue, Chicago 2, Illinois.

BOOK REVIEWS

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Society of Physical Medicine and Rehabilitation.

THE PREVENTION OF RHEUMATIC FEVER. By *Lowell A. Rantz*, M.D., Associate Professor of Medicine, Stanford University School of Medicine, San Francisco, California. Paper. Price, $2.25. Pp. 66, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Avenue, Springfield, Ill., 1952.

The author makes a strong case for group A hemolytic streptococci as the causative agent for rheumatic fever. One half of the book presents convincing evidence in support of this idea. The author's suggestions for prevention of this disease include efforts to diminish transmission and to minimize streptococcal infections. The use of the various drugs, particularly the sulfonamides and penicillin is discussed. The results of the controlled studies are given, together with the author's impressions of the advantages and difficulties. The last chapter deals with the "practical considerations" of patients who have or have had rheumatic fever and presents good, straight forward advice.

RHEUMATIC DISEASES. Based on the Proceedings of The Seventh International Congress on Rheumatic Diseases. Prepared by The Committee on Publications of the American Rheumatism Association: *Charles H. Slocumb*, M.D., Chairman. Cloth. Price, $12.00. Pp. 449, with 126 illustrations. W. B. Saunders Company, West Washington Square, Philadelphia 5, 1952.

This text is a welcome addition to the libraries of physicians interested in rheumatic disorders. It contains numerous articles by investigators prominent in the fields of clinical and experimental medicine. Various rheumatic disorders are covered in an orderly fashion, and an excellent review of the current aspects of therapy is included. Newer laboratory aids in diagnosis are presented. Extensive bibliographies are included after each article, which makes the text extremely valuable as a reference. It is highly recommended to all physicians interested in the field of rheumatic diseases.

STUDIES IN VISUAL OPTICS. By *Joseph I. Pascal*, B.S., M.A., O.D., M.D., Licentiate in Optometry and in Medicine at the University of the State of New York; Director of Eye Department, Stuyvesant Polyclinic; Attending Ophthalmologist, New York Polyclinic Medical School and Hospital, Outpatient Department; Lecturer in Ophthalmology, New York Polyclinic Medical School and Hospital. Cloth. Price, $12.50. Pp. 800, with illustrations. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1952.

This book discusses prisms and lenses in relation to the human eye. While the title might be interpreted by some as promising the results of specialized research, it is apparently intended to mean, rather, that the book takes up special topics instead of offering a complete and balanced treatment of the science of physiological optics. The 46 chapter headings are not grouped by the author, but fall roughly into the following sections: refraction phenomena and refractive errors; retinoscopy and ophthalmic calculations by the author's "Dam" formula; convergence, strabismus, prisms, and orthoptic exercises; astigmatism, toric lenses, and contact lenses.

Many readers will welcome the slow-moving and over-explicit style of this book, while others will find it taxing their patience. Its peculiarities are largely explained by the author's horror of the Greek alphabet and of mathematics beyond plane trigonometry. There is hardly a concept in mathematics simpler than that of the surface called the torus, and a diagram exhibiting this surface would say, concisely and accurately, what is said about toric lenses in page after page of unprecise language in Chapter 4. It takes a college Freshman less than an hour to master enough of the Greek alphabet to read the signs on the fraternity houses, but the author, defending himself in a section entitled "Greek creates difficulties" on page 751, spells out *alpha*, *gamma*, and *kappa* wherever they occur in his text. This surely is doing things the hard way, as becomes especially evident on page 757, where the author's unwilling-

ness to use an occasional Greek letter obliges him to use the lower case English *a* in four different senses. The "Dam" formula, explained on page 117, is a mnemonic device to help the student relate the dioptric power of an interface to its curvature and to the difference of refractive indexes of the two media concerned. This, and a number of other features showing an undeniable understanding of student psychology, will atone for the book's eccentricities in the minds of many readers. To those who share the author's unwillingness to base physiological optics upon an adequate mathematical groundwork this book can be recommended.

DADDY WAS A DOCTOR. By *Lorena Owens*. Cloth. Price, $2.75. Pp. 221, with illustrations by Paul Galdone. E. P. Dutton & Co., Inc., 286-302 Fourth Ave., New York 10, 1951.

The author describes the life of a general practitioner of medicine in a small town, particularly the efforts of three feminine relatives to make his work easier. There is no mystery, suspense, or melodrama in this story; it moves from episode to episode in a happy-go-lucky manner that is soothing, often instructive, occasionally inspiring. It can be recommended as pleasant reading for physicians and patients alike.

INTRODUCTION TO CLINICAL NEUROLOGY. By *Gordon Holmes*, M.D., F.R.S. Second edition. Cloth. Price, $4.00. Pp. 189, with 43 illustrations. The Williams & Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2, 1952.

This relatively brief manuscript is beautifully written and should serve as a very useful publication for the beginner in neurology. The lack of visual material, references and details of differential diagnosis and treatment will diminish its value to neurologists and others as a reference text.

HEMIFACIAL SPASM. A CLINICAL AND PATHOPHYSIOLOGICAL STUDY. By *Robert Wartenberg*, M.D. Foreword by Macdonald Critchley, M.D. Cloth. Price, $4.00. Pp. 86, with illustrations. Oxford University Press, 114 Fifth Avenue, New York 11, 1952.

All those treating patients with facial paralysis and spasm will find this short text of interest. It is well illustrated photographically and has an adequate bibliography. The author considers facial spasm as a release phenomenon and discusses in detail the pros and cons for this conclusion. The only therapeutic suggestions are that centrally acting drugs such as Panparnit(R) or Artane(R) would seem to be of most value theoretically, although no evidence of proved effect is presented.

FRACTURES & ORTHOPAEDIC SURGERY FOR NURSES AND PHYSIOTHERAPISTS. By *Arthur Naylor*, Ch.M., M.B., M.SC. (Sheff.), F.R.C.S. (Eng.), F.R.C.S. (Edin.), Hunterian Professor, Royal College of Surgeons of England; Consultant in Orthopaedic Surgery, Bradford Royal Infirmary; Bradford Children's Hospital; Bradford St. Luke's Hospital; Keighley Victoria Hospital; and Bradford Education Committee. Temp. Major, Orthopaedic Specialist, R.A.M.C. Foreword by *Sir Ernest Finch*, M.D., M.S. (Lond.), F.R.C.S. (Eng.) Vice-President, Royal College of Surgeons of England, Late Professor of Surgery, University of Sheffield, Consulting Surgeon, Royal Infirmary and Hospital, Sheffield. Third edition. Cloth. Price, $5.00. Pp. 315, with 254 illustrations. The Williams & Wilkins Co., Mount Royal and Guilford Aves., Baltimore 2; E. & S. Livingstone, 16 and 17 Teviot Pl., Edinburgh 1, 1952.

This is a text book that considers practically everything included in the large orthopedic books in a short, sketchy fashion. The method described might be more confusing than helpful. Although the book is intended for nurses and physiotherapists, very little specific information is given for the physiotherapist. The treatment for the conditions is that practiced in England and at times is at variance with what is done in this country.

CARBOHYDRATE METABOLISM. Correlation of Physiological, Biochemical and Clinical Aspects. By *Samuel Soskin*, M.D., Director of the Medical Research Institute, Michael Reese Hospital, Dean of the Michael Reese Hospital Postgraduate School, Associate Professor of Medicine, Northwestern University and *Rachmiel Levine*, M.D., Director of Metabolic and Endocrine Research, Michael Reese Hospital, Professional Lecturer in Physiology, University of Chicago. Revised (second) edition. Cloth. Price, $8.50. Pp. 346, with illustrations. The University of Chicago Press, 5750 Ellis Avenue, Chicago 37, 1952.

The first edition of this useful correlative text for student and internist was issued in 1946; the second edition was necessitated by the great increase in the understanding of tissue metabolism which has arisen from the expanded use of isotopic tracers. Thus, the two-carbon acetate fragment is now identi-

fied as more or less of a least common denominator in metabolism and such a "waste" metabolite as carbon dioxide is known to be subject to re-utilization. The topic extends beyond the title, since carbohydrate metabolism cannot be discussed without an understanding of the participation of fats and proteins, the mechanism of action of adrenal and pituitary and pancreatic hormones and the pathological physiology of metabolic disease.

The last chapter on "Present Frontiers of Research in Metabolism" points up the direction of a field of study which "will not only furnish us with exact knowledge of the methods used by the natural enemies of mankind but suggest new weapons to cope with them." The book is clearly written, the text is supplemented by charts of noteworthy clarity; it is well produced and all in all a credit to the authors and publisher. It is recommended to all who desire a substrate of fundamental knowledge in the field of metabolism, but who lack time and training to explore and assess its burgeoning literature.

THE PRINCIPLES AND METHODS OF PHYSICAL DIAGNOSIS. Correlation of Physical Signs with Physiologic and Pathologic Changes in Disease. By *Simon S. Leopold*, M.D., Associate Professor of Clinical Medicine, School of Medicine and Graduate School of Medicine, University of Pennsylvania; Director of Teaching of Physical Diagnosis, School of Medicine; Chief of the Thoracic Clinic, Hospital of the University of Pennsylvania. Cloth. Price, $7.50. Pp. 430, with 390 illustrations with 19 color plates. W. B. Saunders Company, West Washington Square, Philadelphia 5, 1952.

Instruction of medical students in physical diagnosis is such an important part of medical education that new and improved aids are welcome. This text seems to be of real value and is recommended for inspection by teachers of physical diagnosis before choosing a text for students. Description of normal and abnormal findings is clear and concise giving an account of disrupted physiologic processes, or of pathologic changes, without attempting to present an abbreviated clinical text of medicine. The many excellent photographs, including color plates, are an especially attractive feature of the book. The examination of the musculoskeletal system is more detailed than is usual and includes selective reproductions of muscle testing from the manual of Daniels, Williams & Worthington. The print, paper, and binding are attractive.

THE WILL TO LIVE. By *Arnold A. Hutschnecker*, M.D. Cloth. Price, $3.50. Pp. 278. Thomas Y. Crowell Company, 432 Fourth Ave., New York 16, 1951.

This is a better than mine-run "bootstrap" or self-help through self understanding book. It is not as penetrating as Karl Menninger's "Man Against Himself" from which in part it derives. The accumulated case anecdotes will rouse answering chords in those who turn to these books for help. The suggestion that "By true adjustment . . . we can achieve the satisfactions of healthy living," is meritorious; but it is not made clear just how this is accomplished. The advocacy of caviar and champagne as a diet in times of stress is better warranted than the use of cortisone as an alternative to psychotherapy. The book can interest only those lay readers constitutionally devoted to this form of literature.

THE CASE OF DORA AND OTHER PAPERS. By *Sigmund Freud*. Translation by Joan Riviere, Alix and James Strachey, R. C. McWatters, E. B. M. Herford and E. Colburn Mayne. Cloth. Price, $3.50. Pp. 243. W. W. Norton & Company, Inc., 101 Fifth Avenue, New York 3, 1952.

To those who have formed their opinion of Freud at second hand from the eulogies of his followers or the complaints of his critics, this book is urgently recommended as affording a first-hand basis for judgement. It consists of eight characteristic essays in magnificent translation. The first, in particular, "The Case of Dora," is so painstakingly relentless in its exposition, and so fascinating in its details, as to remind one of Poe's "Murders in the Rue Morgue." The characteristic weakness of such modern psychiatry is instanced on p. 174, where it is assumed that nervousness is on the increase. In rigorous scientific work such a supposition should be proved by numerical data before one casts about for hypotheses to explain it. But the penetration, originality, and courage of Freud's thinking still command respect and retain a surprising freshness nearly half a century after their initial publication.

UNTOWARD REACTIONS OF CORTISONE AND ACTH. By *Vincent J. Derbes*, M.D., F.A.C.P., Associate Professor of Medicine, Tulane University of Louisiana, School of Medicine; Head of Department of Allergy, Ochsner Clinic; Visiting Physician, Charity Hospital of Louisiana at New Orleans; and Staff Member Foundation Hospital, New Orleans, Louisiana and *Thomas E. Weiss*, M.D., Instructor in Medicine, Tulane University of Louisiana School of Medicine; Member of Department of Medicine, Ochsner Clinic; Visiting Physician, Charity Hospital of Louisiana at New Orleans; and Staff Member,

Foundation Hospital, New Orleans, Louisiana. Paper. Price, $2.25. Pp. 77, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Avenue, Springfield, Ill., 1951.

This is another short monograph of the American Lecture Series. These works are timely and very much worth while. With the wide spread use of these new drugs, it is well that reference be readily available which explain the various complications that accompany their use. The word "reactions" is well chosen, since the effects of the drugs are merely the physiological responses to huge dosage. The authors have included the best references, presenting them in a logical and unbiased manner. This book will be a source of reference for many years.

BONE TUMORS. By *Louis Lichtenstein*, M.D., Senior Pathologist, General Medical and Surgical Hospital, Veterans Administration Center, Los Angeles. Formerly Associate Pathologist, Hospital for Joint Diseases, New York. Consultant in Bone Tumors, Tumor Registry of the California Medical Association Cancer Commission. Sometime Lecturer in Bone Pathology, Medical Extension, University of California at Los Angeles. Cloth. Price, $10.50. Pp. 315, with 155 illustrations. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1952.

This book presents a most difficult subject with unusual clarity. Several chapters consider the non-malignant types of tumors and others the malignant forms. A chapter on multiple myeloma is particularly good. A final appendix on "some nonneoplastic lesions of bone which may be mistaken for tumors" is included. Each chapter gives a discussion of the history of the individual tumor briefly, followed by clinical features, roentgenographic appearance, gross and microscopic pathology, treatment, prognosis and a summary. Presentation of this much material in 300 pages is a noteworthy accomplishment. The illustrations of the roentgenograms and pathological sections are excellent.

THE TREATMENT OF DIABETES MELLITUS. By *Elliott P. Joslin*, A.M., M.D., Sc.D., Medical Director, George F. Baker Clinic, New England Deaconess Hospital; Clinical Professor of Medicine Emeritus, Harvard Medical School; Consulting Physician, Boston City Hospital; *Howard F. Root*, M.D., Associate in Medicine, Harvard Medical School; *Priscilla White*, M.D., Sc.D., Instructor in Pediatrics, Tufts College Medical School and *Alexander Marble*, A.M., M.D., Clinical Associate in Medicine, Harvard Medical School. Ninth edition. Cloth. Price, $12.00. Pp. 771, with illustrations. Lea & Febiger, Washington Square, Philadelphia 6, 1952.

The 9th edition of the textbook "Treatment of Diabetes Mellitus" by Joslin, et al., represents a revision of the textbook which has been one of the standard textbooks in the field of diabetes for many years; it is a revision to the extent that many subjects are omitted or shortened. Some subjects are revised by addition. There are some outstanding omissions, particularly for those individuals who see diabetes in their everyday office practice and treatment. For diabetologists and clinical endocrinologists, the textbook leaves much to be desired. However, for the individual who desires a vast amount of information on the subject of diabetes from many aspects, it is exceedingly well done.

SIDE EFFECTS OF DRUGS. By *L. Meyler*, Consulting Physician at Groningen (Netherlands). Translated by Ph. Vuijsje and W. Mulhall Corbet, Amsterdam. Cloth. Price $5.50. Pp. 268. The Elsevier Publishing Company, 402 Lovett Blvd., Houston, Texas, 1952.

This is a translation, into excellent English, from the original Dutch. The author has collected information about the undesired effects of most of the natural and synthetic drugs in use today. This makes impressive reading, especially in those sections dealing with the antibiotics, sulfas, and hormones. Surprising is, for instance, the persistence of an altered intestinal flora as long as eight months after the cessation of treatment with aureomycin, and the high incidence of deafness after neomycin. Chapter after chapter piles up evidence that every physician must be prepared to recognize the undesired effects of every drug he prescribes, that the introduction of a new drug must be preceded by thorough toxicological studies, that the new remedies should not be used for trivial ailments if they are to remain useful for serious illness, and that self-medication, even with substances like aspirin and boric acid, is dangerous. Minutely documented and indexed, this book is a valuable key to the literature and essential to the completeness of a medical library.

ARTHRITIS AND RHEUMATISM. The Patient's Guide to Treatment. By *David E. Rodger*, M.D., M.R.C.P. (L); F.R.C.P. (C), Physician, Medical Arts Clinic, Regina, and *Gwyneth M. Miller*, M.C.S.P., C.P.A., Physiotherapist, Saskatchewan Division, Canadian Arthritis and Rheumatism Society. Cloth. Pp. 72 with illustrations. Burns and Mac-

Eachern, 165 Elizabeth Street, Toronto 2, 1952.

A simple little book telling about the more common forms of rheumatic diseases, this volume should be of some help. Approximately one half of the book is devoted to physical measures. The authors believe that "physiotherapy is the keystone of treatment in rheumatism and arthritis." Twenty-five pages out of a total of seventy-two pages are devoted to exercises, the detail of which may appear too complicated to the average patients. The final chapter tells of the purposes of the Canadian Arthritis and Rheumatism Society.

POST-GRADUATE LECTURES ON ORTHOPEDIC DIAGNOSIS AND INDICATIONS. By *Arthur Steindler,* M.D. F.A.C.S., Professor of Orthopedic Surgery, State University of Iowa, Iowa City, Iowa. Volume IV. Cloth. Price, $9.75. Pp. 318, with 338 illustrations. Charles C Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, Ill., 1952.

This text of some 318 pages and 338 illustrations is divided into two main sections. The one concerns arthritis and diseases of muscles, bursae, tendons and fasciae and the other treats of the deficiency and degenerative diseases of the locomotor system. The first section takes the form of some twelve lectures and concerns the diagnosis, pathology, and treatment aspects of the various forms of arthritis, syphilis of bone and joint, the inflammatory diseases of muscles, Dupuytren's contracture, diseases of tendons and bursae, primary or neuromuscular diseases, muscular dystrophies and atrophies. The second section comprises five lectures on such topics as avitaminosis, senile diseases of the bone, degenerative bone diseases, avascular necrosis or the osteochondritides and the neuro-arthropathies. The material is well presented and in most instances well illustrated. Of note is the absence of mention of the use of the steroid drugs in the treatment of some forms of arthritis. The publishing is excellent. The book is recommended for use by all interested physicians.

PHYSICAL MEDICINE ABSTRACTS

Effectiveness of Different Forms of Heating. H. M. Whyte, and S. R. Reader.

Ann. Rheumat. Dis. **10**:449 (Dec.) 1951.

It is generally stated that diathermy and penetrating short-wave infra-red radiation are more effective for heating deep subcutaneous tissues than are the nonpenetrating rays of long-wave infra-red or the heat derived from direct contact, but there are few experimental studies on the extent of the difference involved. Tests were made in the lumbar area of one subject on different days and several interesting observations were made. The first is that the effectiveness of heating is practically the same with a contact method as with radiant heat from a dark source. Both of these methods are most useful for heating skin and, although tissues to a depth of 3 or 4 cm. are warmed, the methods are of little value for raising deep temperatures much above the temperature of blood. The results in the present study are not strictly comparable, since different degrees of heat are used, but it is unlikely that the effectiveness of the methods differs to any extent, as in both cases the heat is absorbed at the surface and then spreads inwards by conduction and convection. The same considerations will apply to all forms of localized heating applied to the surface, such as hot-water bottles, hot-water wax and other substances, or electric pads or blankets. The second point is the superiority of the tungsten-lamp radiation over radiant heat of longer wavelengths. This is largely attributable to the ability of short-arm infra-red radiation to penetrate skin. The results show also that both surface and deep temperatures can be maintained at a higher level with the same degree of comfort when the tungsten lamp rather than the darksource radiation is used. This has been confirmed for a large series of observations in different subjects. The difference in intensities of the two lamps is largely due to reflection by skin of a considerable proportion of the tungsten radiation. The third point is the usefulness

of diathermy for heating muscle. Finally, needle thermocouples, as used in the present investigation, can be recommended for recording deep temperatures and measuring the changes caused by different procedures such as the application of heat or cold. The lumbar region has many advantages for a study of this type.

Subdeltoid Bursitis. Harold O. Hallstrand.

Illinois M. J. 100:361 (Dec.) 1951.

In acute traumatic subdeltoid bursitis, the immediate relief of pain is the primary objective. After three to five days, when acute symptoms have subsided, gentle exercise may be started. Bending forward at the waist, while swinging and then maintaining the arms forward and then straightening up will elevate the arm overhead without the abductor muscles having to exert themselves against pull of gravity. Doing this and similar types of exercises for three to five minutes four times daily should avoid adhesion formation and stiffening of the shoulder. Heat and gentle massage may be of some value now. Recovery may be complete in two weeks. In post-traumatic adhesive subacromial bursitis, treatment is directed at separating the adhesions and restoring normal motion. Until this is accomplished, no permanent relief of pain can be expected. With mild symptoms and only moderate restriction of motion, the previously mentioned exercise plus a circular pendulum-like swing to the arm while bending forward at the waist, may be all that is necessary. Diathermy and heat usually are of help, and the patient is advised to use the arm as much as possible and sleep with it overhead. With severe pain and marked restriction of motion, the adhesions must be separated by manipulation under local or general anesthesia. The humerus is slowly and gently fully elevated and internal and external rotation instituted. Great care must be exercised, as fractures of the humerus and/or clavicle may occur during manipulation. Opiates and salicylates are given, and the patient is instructed to elevate the arms overhead by means of various exercises within twenty-four hours of manipulation, even though great pain is caused. Faithful performance of these exercises usually results in marked improvement within a few days.

Conservative Treatment of Degenerative Arthritis of the Knee. Oscar O. Selke, Jr.

South. M. J. 45:358 (Apr.) 1952.

Degenerative joint changes in the knee should be considered not only with patients of advanced age but with all patients exhibiting knee instability or complaining of knee pain. Degenerative changes often begin early in adulthood, but seldom are they labeled arthritis. Often these changes are not due to metabolic disorders of the cartilage but are due to repeated injury.

Treatment for degenerative arthritis of the knee evolves into three phases, namely: the reduction of joint inflammation, the lessening of traumatizing joint movement and the strengthening of the hypotonic muscles.

Local application of heat is of specific value in alleviating the pain associated with degenerative arthritis. (A reduction in pain may be assumed to reflect an improvement in the inflammatory state.) Such heat may be efficiently applied by diathermy or by means of a baker.

The patient who does not respond to diathermy usually will find relief in the application of infrared or luminous heat by means of a baker. Following application of heat, treatment is directed towards the weakened musculature. All exercise should be of a type that will place no strain or trauma on the knee joints, yet will be of sufficient vigor to increase muscle strength. The following three exercises fulfill these requirements: quadriceps setting, hamstring exercises and gastrocnemius exercise.

It should be emphasized that good results cannot be obtained unless maximum muscle tension is created during each exercise movement, and that the exercise should be repeated until the muscle is fatigued. Although these exercises are very simple, they will increase muscle tone, strength, and coordination, with minimal joint trauma, if the patient will put determination into each movement.

Treatment of degenerative arthritis of the knee is not complicated but requires attention to detail. Treatment is not complete unless the patient is coached in daily living habits which affect the knee, including diet, movement patterns, posture, and degree of activity. Every patient should have treatment to improve his present state and to minimize progression of the disease.

Present Status of the Use of Ultrasonic Energy in Physical Medicine. Frank H. Krusen.

South. M. J. 45:55 (Jan.) 1952.

Applications of ultrasonic energy can produce sharply localized heating of living tissues and can cause selective heating of bone cortex and bone marrow as does no other source of energy employed so far for medical diathermy.

If ultrasonic diathermy is employed clinically, a wide margin of safety with regard to dosage is necessary because of the unexpected variations which frequently arise.

Ultrasonic energy of the intensities and frequencies employed in physical medicine probably has no effect on conduction in peripheral nerves other than the effects produced by the rise of temperature.

In normal tissues ultrasonic energy can produce destructive reactions which may occur at the point of application of the ultrasonic energy, throughout the pathway of the radiation through the tissues, or at the point of exit. The degree of destruction varies according to the type and density of the tissues and according to the presence or absence of fascial barriers. The reactions obtained in various animals in the study made by Krusen were similar and varied not with the animal but with the intensity and duration of the treatment.

In nearly all of Krusen's studies, maximal doses were employed. However, except in one study, the doses did not exceed even half those which are available on one of the machines commonly employed by physicians. The maximal dosage used by Krusen (except in a few instances) was 25 watts for thirty minutes. The machine is capable of providing 60 watts for indefinite periods of time. It is evident, therefore, that such a machine when employed at maximal dosages can produce severe damage of many types of tissue. The spinal cord, peripheral nerves, testes, growing bones and hair follicles appear to be particularly susceptible.

The danger of intensification of dosage by reflection from fascial barriers or gas pockets must always be considered. The effects of ultrasonic energy on living tissues appear to be chiefly those of heating.

From the therapeutic standpoint, it must be remembered that many potent therapeutic agents are dangerous in overdoses. When no anesthesia is employed, pain will serve as a danger signal and prevent overheating of tissues. In proper dosage, ultrasonic diathermy may well produce valuable selective heating effects not previously obtainable. The possibility that ultrasound may produce effects on the tissues other than thermal ones, is recognized. Nevertheless the effects obviously are chiefly those of heating and there is no need for ultrasound to produce other mysterious effects for it to be of value in therapy. It must be realized that many thousands of patients have been treated with ultrasonic diathermy in Europe without apparent harmful effects. However, it is believed that physicians should await further cautious study of ultrasonic therapy before employing it indiscriminately in practice.

Treatment of Burns: The General Condition, Early Definitive Care of the Local Area, and Repair of the Sequelae: A Plan for Care of the Survivors of an Atomic Attack or Any Mass Disaster. James Barrett Brown, and Minot P. Fryer.

J. Missouri M. A. 48:973 (Dec.) 1951.

This is a discussion of what is thought to be the best treatment of burns: supportive therapy with adequate supply of whole blood, antibiotics and adequate diet in a hospital, with fine mesh grease, gauze, mechanics waste, pressure dressings, done as often as necessary, under anesthesia, for rapid preparation for skin grafting when there has been full thickness loss of skin in any type burn. Once skin grafts have become stable, physical therapy and directed exercises may of great help. In burns of the hands, every effort should be put forth to prevent deep infection which will rapidly fix tendons and joints and produce deformities that may never be overcome. It is particularly essential to get all areas of full thickness loss clean and covered with grafts as soon as possible. There seems to be no agreement concerning the respective merits of early motion and immobilization, but perhaps most will agree that active movements of the fingers should not be delayed, especially in adults. Active movements in soapy water at the time of each dressing are encouraged as giving the best results. Physical therapy has a definite place in the rehabilitation of burned patients. Extremities splinted until healed or until a skin graft is solid require restoration to function. The aim in the early resurfacing of a burned part is the return to useful function as soon as possible. This results in less deep scar than if spontaneous healing is waited for. Most patients so grafted require only limited physical therapy. It is started as soon as possible after a rapid surgical restoration. Active motion in a pan of warm soapy water usually is all that is necessary, and the usual eager patient can carry on on his own at an early date. The rapid restoration of function of a child is a good demonstration of this possibility. Badly fixed hands, of course, require long continued work in physical therapy. At a later date it is important to recognize how much disability is in the joints rather than overlying scar as forced manipulation may make this worse instead of better. Possible first aid for treatment of burns on a disaster scale and military is outlined, including those burns of atomic origin.

Physical Medicine and Rehabilitation in Acute Myocardial Infarction. Louis B. Newman; Mildred F. Andrews; Margaret O. Koblish, and Lyle A. Baker.

Arch. Int. Med. 89:552 (April) 1952.

This is a report of a program involving both physical and occupational therapy, organized and put into effect as a routine part

of the management of all patients with acute myocardial infarction. This program has been in effect since June 1948 and their results have been extremely gratifying.

The first week of treatment consists of complete bed rest, with interviews by the rehabilitation staff if the patient's condition permits. The active program begins in the second week, with the following immediate objectives: (1) to teach the patient both physical and psychological rest; (2) to instill a proper mental attitude in the patient toward his illness and to prevent the development of anxiety neurosis; (3) to return muscle tone and strength in order that the patient may be ready for physical activity; (4) to aid in prevention of peripheral circulatory stasis, which is conducive to phlebothrombosis; and (5) to help the patient understand his physical limitations and how to control his activities during convalescence and after discharge. The patient is given supervised exercises, including diaphragmatic breathing, which is gradually increased in the third and fourth weeks. Progressive walking is started in the fifth week, and during the sixth week is increased to include stair climbing. Ambulation thus is accomplished with less physiological disturbance and apprehension, and strength and endurance are recovered more rapidly. It also has been noted that the incidence of anxiety neurosis following recovery from acute myocardial infarction is much less under such a regimen.

Since this program was initiated, approximately 300 patients suffering from acute myocardial infarction have been managed accordingly. For the most part, the response and cooperation of the patients have been gratifying. Acceptance has been stressed by Grayson as of great importance in the success of any rehabilitation venture. Among patients suffering from acute myocardial infarction, this factor is rarely lacking. On occasion a patient, because of lack of sufficient insight, may consider the conservative, slowly progressive activity as ridiculous and may resent the close supervision. Rarely, resentment of the patient toward the misfortune of his illness may be so great that it is impossible to create any interest on his part in rehabilitation. In the majority of such cases, however, the program seems to be a most successful means of overcoming this particular mental attitude. Generally the patients welcome and are appreciative of the close attention, encouragement, and progressive nature of the program. It does much to offset the monotony, as well as giving them an objective means of measuring their progress through increasing physical activity. The rehabilitation program contributes to more satisfactory recovery and adjustment on the part of the patient. Whenever possible, patients who should not return to their former type of occupation are seen by the vocational adviser regarding new employment. If the need arises, a social service worker should evaluate the home situation. Under such a program both the physician and the patient will have a much clearer concept of the patient's physical and mental capabilities, resulting in more objective and realistic plans for the future.

Use of Ultra-Violet Light in Skin Diseases. Clara M. Warren.

Brit. J. Phys. Med. 15:205 (Sept.) 1952.

In a recent review of famous textbooks on dermatology and x-ray therapy, Warren found that some writers were doubtful as to the value of ultraviolet light in dermatological conditions. It seemed that if ultraviolet light apparatus and administrators were available ultraviolet light was used, but if superficial x-rays were more accessible these were used more frequently. This brings up the problem as to whether the ultraviolet light apparatus should belong to the skin department, there to be administered by qualified dermatologists, or whether the apparatus should remain in the department of physical medicine. As a dermatologist, Warren feels that she should order and supervise the administration of ultraviolet light herself so that there would also be more freedom in using local medicaments between treatments. She would be able to start treatment for the patient immediately without his having to be put on a waiting list for treatment. However, it is pointed out that when the department of physical medicine supervises the treatment there is the benefit of discussions with the other physicians. New and different methods of treatment can be assessed, and the friendly cooperation helps to prevent further isolation of departments.

The author gives a brief discussion of the various types of ultraviolet light, contraindications and dosage and reports that following skin disorders have been benefited by her treatment with ultraviolet light: pyodermas, infected fissures, moniliasis of mouth, acne, deep pustular acne, keloids, alopecia areata, psoriasis, vitiligo, synovial joint cysts, lupus vulgaris, and traumatic leg ulcers and varicose ulcers.

Pain Reaction to Locally Applied Heat. F. B. Benjamin.

J. Applied Physiol. 4:907 (June) 1952.

An instrument has recently been designed and built by Guillemin of the Aeromedical and Physical Enviroment Unit of the University of Illinois which permits the heating of a small area (16 mm.) of the skin with immediate registration and accurate control of temperature and energy input. The heat is

applied by means of a probe which ends in a thin square sheet of metal (0.5 x 4 x 4 mm.) which is in contact with the resistance thermometer and a heating element. A complete description of the instrument has been published earlier.

To determine the pain threshold with this instrument the applicator was placed on the skin and the probe temperature, and indirectly the temperature of the skin with which it is in contact, were increased with a constant energy input. The threshold was taken as the point where pain was first reported. Ten normal young males, who were specifically trained for accurate perception of the pain threshold, were used. By changing the rate of temperature increase in a random fashion the element of subjectivity was largely eliminated. The results show that the surface temperature at the time the pain threshold is reached is directly related to the heat energy input, and that the temperature gradient across the skin (measured with thermocouples) at the time the pain threshold is reached is directly related to the heat energy input. The findings are discussed in view of the various theories of heat pain and found compatible with the view of Buettner that heat pain is determined by a definite temperature level at a point slightly below the skin surface.

A Method of Quantitative Heat Application to Small Skin Areas at Controlled Temperature. V. Guillemin; M. Benjamin, T. Cornbleet, and M. I. Grossman.

J. Applied Physiol. 4:920 (June) 1952.

In connection with certain experiments on the effects of heat stimulation on small areas of the human skin, it became necessary to design a probe for applying measurable quantities of heat energy at known temperatures. The instrument described here has been found to be well adapted for this purpose and incorporates certain novel features of construction which merit description.

The important specifications to be met are: (1) temperature of the probe should be constant over the whole surface of contact; (2) temperature sensing element should indicate the true temperature of the probe surface; (3) heat capacity of the heater-thermometer assembly should be as low as possible, and (4) temperature is indicated directly on a dial (rather than being found, for example, by balancing a potentiometer), which adds greatly to the convenience of use of the probe. It is also desirable that the instrument be rugged, stable, portable and convenient to operate.

Methods are described for calibrating the probe and for determining how closely the indicated temperature corresponds to the true temperature of the probe tip surface. This probe has been used to determine the influence of temperature and duration of heat stimulation in the production of skin flare, macule and blister formation in the human skin.

Medullary Fixation of Fractures of the Long Bones. Rufus H. Alldredge; Daniel C. Riordan, and Crampton Harris.

New Orleans M. & S. J. 104:619 (Sept.) 1952.

Medullary fixation of the long bones was first attempted many years ago, only to be discarded for other methods, for reasons which are not entirely clear at this time. During the past ten years the method has been improved and standardized, until at present it is regarded as a sound and comparatively safe procedure, commonly employed by orthopedic surgeons in many parts of the world.

Medullary fixation by pin or nail combines four principles of fracture treatment which, particularly in fractures of the femur, cannot be accomplished as well by any other means: (1) simplicity, adaptability, and safety to the patient during application of the technique; (2) accurate reduction of the fracture; (3) good, reliable, anatomical reduction of the fragments, with dependable maintenance of position, without distraction, and with provision for impaction of the ends of the fragments through exercise and weight bearing, and (4) early postoperative use of the muscles and joints, and early weight-bearing.

In fractures of the femur, medullary fixation has notable advantages. As external fixation, traction, splints, plaster casts, or bed traction are not required postoperatively in most cases treated by this method, frequently, the patient may begin actively moving the part on the second or third postoperative day. When medullary fixation of the femur is accomplished soon after the occurrence of the fracture, exercise of the limb with full range of motion in all joints of the extremity may be undertaken in bed on the first or second postoperative day. In other cases, bed exercises may be started between the third and seventh days, depending on the needs and limitations of the individual patient. It is desirable for many to begin ambulation with crutches on the fifth or sixth day, and light weight-bearing with crutches after the seventh or eighth day. Thus, the usual muscle wasting and atrophy are avoided, and the possibility of joint fibrosis, or stiffness, is eliminated. The function of the limb is fully maintained while healing takes place, and the early weight-bearing with support (such as crutches) causes impaction of the ends of the bones, which actually hastens healing. The enormous benefits and advantages to the patient are

self-evident.

The authors have summarized their experience with the use of medullary fixation for fractures and certain conditions of the femur and the other long bones, over a period of six years. Medullary fixation of the long bones is a highly technical, precision type of procedure, and should be undertaken only by physicians who are experienced in the surgical care and treatment of fractures, and only in hospitals where the special facilities necessary for the management of such cases are readily available. However, when the procedure is properly carried out, from the primary consideration of selecting the patient, to the final detail of postoperative care, the patient may derive greater benefits from this method than from any other for the treatment of fractures of the long bones, particularly fractures of the femur.

Peripheral Nerve Injuries. A. J. Slessor.

Edinburgh M. J. 59:13 (Jan.) 1952.

In the treatment of peripheral nerve injuries in the early days of the war there was a tendency to over-splint and to splint incorrectly, and the main disability of some patients today can be attributed to this tendency, in particular with regard to the metacarpophalangeal joints. Slessor believes that splints are necessary for only the following types of nerve injury: in paralysis of the deltoid; in paralysis of biceps brachii; in paralysis of the musculospiral nerve, where use of a good splint will not only prevent overstretching of the paralyzed muscles but will permit useful function in the hand, and in paralysis of the lateral popliteal nerve to prevent foot-drop. He feels that to date a satisfactory splint for injuries of either median or ulnar nerve has not been devised, and that an intelligent patient can prevent deformity by faithful passive exercise of the affected digit, which should be taught him by his surgeon.

A limb which is the site of nerve injury must undergo a full range of movement at least three times a day; this should be active when possible, passive when necessary, and should be supervised by a physical therapist at least once each day. This is by far the most important part of physical therapy in nerve injuries, and the most important part of non-operative treatment. During the war, more than 500 patients were sent home by troop-ship without facilities for treatment en route, and when Slessor saw many of them later, it was obvious that the mobility of their hands was directly proportional to the assiduity with which the movements had been performed. Passive movements should be begun as soon after wounding as the patient can cooperate; stiffness and contractures almost disappeared in patients from the Burma front once this became understood by the forward medical officers.

Once a limb has been warmed, massage may be comforting, but Slessor doubts if it has any true therapeutic value in peripheral nerve injuries.

In any center where large numbers are under treatment, the routine use of galvanic stimulation is impossible since there is not sufficient time. Nevertheless, it has been shown that the application of 90 stimuli each day for six days each week is successful in preventing wasting of intrinsic hand muscles, except in the early weeks following injury, when it lessens the amount of wasting, that in itself being of significance. This is more practicable if reserved for injuries of the median and ulnar nerves.

Once neurological recovery has occurred, an attempt must be made to enable the patient to resume accurate voluntary control. Some attempt must be made to reeducate the individual muscle to respond, but it has to be confessed that the results are in the main disappointing.

Guided Symphysis: Functional Prophylaxis in Exudative Pleurisy and Pneumothorax Fluid. G. Birath.

Am. Rev. Tuberc. 66:134 (Aug.) 1952.

Ventilation insufficiency is one of the commonest causes of pulmonary insufficiency, and preventive measures should be directed against the condition generally responsible for ventilatory impairment, viz., pleurisy with effusion and pneumothorax fluid. The role of the diaphragm in this connection is particularly stressed in this article.

A program of prophylaxis is described, consisting of adoption of the lateral posture with the affected side uppermost, and breathing exercises. Repeated, deep respirations prevent undesirable adhesion of the diaphragm to the chest wall and the formation of pulmonary adhesions on sites unfavorable for function. The patient is therefore instructed to take about fifteen deep breaths each hour. Physical therapy also includes abdominal breathing, so that the greater part of the ventilatory movement is performed by the diaphragm and not by the thoracic cage. When performing breathing exercises the patient should, of course, adopt those postures in which the diaphragmatic movements bring about maximum opening of the costophrenic sulcus, viz., the lateral posture with the affected side uppermost, and forward and backward rotation from this posture. At a later stage in therapy the patient is taught to breathe selectively in order to increase the mobility of the ribs on the affected side. This is most easily achieved by

breathing against resistance, for example, a band held around the thorax.

There is a question as to whether breathing exercises should be begun in the initial stage of pleurisy, when the patient is still febrile, or should wait until the temperature has become normal. In the hundred or more patients treated up to the present, therapy was begun as soon as the patient entered the hospital, regardless of the stage of the disease, and no untoward effects have been observed. Naturally, some caution in the performance of breathing exercises is advisable in the most acute phase of the illness; but posture therapy need not be modified and may be instituted without delay. Sometimes a patient cannot understand fully the instructions for breathing exercises or is physically unable to cooperate. There may be reflex immobility of the diaphragm in the initial phase of pleurisy. In such cases diaphragmatic movements can be artificially produced by stimulation of the phrenic nerve with the electrophrenic respirator devised by Sarnoff and associates.

The Effect of Ultraviolet Light on the Skin and Hemoglobin of Patients Treated with Iron. J. L. D'Silva, and M. W. Partington. Ann. Phys. Med. 1:56 (Apr.) 1952.

A series of patients, referred to the Department of Physical Medicine of the London Hospital for irradiation with ultraviolet light, was divided at random into four groups, each of which was irradiated for six weeks. Groups I and II received infrared irradiation, and Groups III and IV ultra-violet light Groups II and IV were given Fersolate, gr. 6 three times daily (representing a total dose of 6 gr. ferrous iron) in addition. The administration of iron was continued for ten weeks. Hemoglobin determinations were made on each patient at the first attendance, after the six-weeks course of irradiation, and again four weeks later. In this group of patients referred to as "ray treatment," iron given by mouth, ultraviolet light, or iron and ultraviolet light given together had no effect in increasing the blood hemoglobin concentration, although, on the average, this was only 12.6 g./100 ml. blood. There is no evidence in this series that the skin of patients receiving iron is in any way sensitized to the action of ultraviolet light. Not only is evidence lacking from the long-term experiments, but even when iron was given intravenously, no sensitization of the skin to ultraviolet light occurred.

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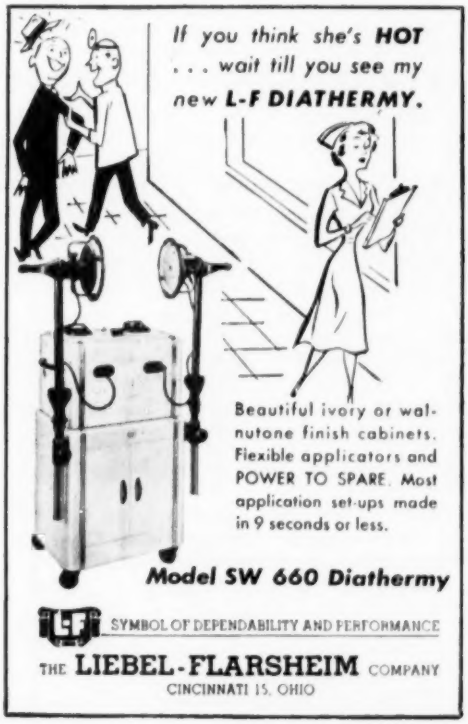
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SYMPOSIUM ON POLIOMYELITIS

CLINICAL DEMONSTRATIONS

Miami Valley Hospital, Tuesday May 26, 1953, 1:30-4 p.m. by the Miami Valley School of Nursing in cooperation with the Montgomery County Chapter American Red Cross and Polio Foundation. Moderator: Herman J. Bearzy, M. D. Director, Department of Physical Medicine and Rehabilitation, Miami Valley Hospital, Dayton, Ohio.

1. **Nursing Procedures in the Acute, Convalescent and Chronic Stages of Poliomyelitis.**
2. **Therapeutic Applications of Hot Packs.**
3. **The Use of the Respirator and Nursing Care in the Respirator. The Advantage of the Positive Pressure Dome.**
4. **The Use of the Rocking Bed and Nursing Care on the Bed.**
5. **Physical Therapy and Occupational Therapy Procedures in the Acute, Convalescent and Chronic Stages of Poliomyelitis.**
6. **Bracing Procedures.**
7. **Color Film.**

PROGRAM

Biltmore Hotel, Dayton, Ohio

Wednesday May 27, 1953, 1:30 P.M.

Moderator and Chairman: Herman J. Bearzy, M.D.

1. The Diagnosis and Treatment of Acute Bulbar and Bulbospinal Poliomyelitis: by Warren E. Wheeler, M.D., Professor of Pediatrics, Ohio State University, Columbus, Ohio.

2. Physical Medicine and Rehabilitation in the Treatment of Poliomyelitis: by Gordon M. Martin, M.D. Section, on Physical Medicine and Rehabilitation, Mayo Clinic, Rochester, Minnesota.

3. The Correct Psychological Attitude Toward Severe Paralytic Poliomyelitis: by Kenneth D. Arn, M.D., Internist, Dayton, Ohio.

4. Progress in Research Pointing to the Eventual Control of Poliomyelitis: by Hart E. Van Riper, M.D., Medical Director, The National Foundation For Infantile Paralysis, New York, N. Y.

5. Question and Answer Period.

MEETINGS OF INTEREST TO THOSE IN THE FIELD OF PHYSICAL MEDICINE AND REHABILITATION

In this column will be published information about meetings of interest to those in the field of physical medicine. New data should be sent promptly to the office of the ARCHIVES, 30 North Michigan Avenue, Chicago 2, Illinois.

American Congress of Physical Medicine and Rehabilitation — 31st Annual Session, The Palmer House, Chicago, August 31 through September 4, 1953. Walter J. Zeiter, M.D., Chairman, Convention Committee, 30 North Michigan Ave., Chicago 2.

Chicago Society of Physical Medicine and Rehabilitation — Regular monthly meetings, September through May, every fourth Wednesday. Dr. I. F. Hummon, Secretary-Treasurer, 30 N. Michigan Ave., Room 1429, Chicago.

New York Society of Physical Medicine — Monthly meetings held first Wednesday. Madge C. L. McGuinness, M.D., Secretary, 48 E. 62nd St., New York 21, N. Y.

Pennsylvania Academy of Physical Medicine and Rehabilitation—Regular meetings on third Thursday of month, held bi-monthly. Secretary, Charles A. Furey, M.D., 2201 St. James St., Philadelphia 3, Pa.

American Occupational Therapy Association—Annual Conference, November 13-20, 1953, Shamrock Hotel, Houston, Texas. Marjorie Fish, OTR, Executive Director, 33 West 42nd Street, New York 18, N. Y.

American Physical Therapy Association — Annual Conference, June 15-19, Baker Hotel, Dallas, Texas. Mildred Elson, Executive Director, 1790 Broadway, New York 19, N. Y.

International

World Congress of the World Confederation for Physical Therapy—London, England, September 7-12, 1953. Secretary, Miss M. J. Neilson, Chartered Society of Physiotherapy, Tavistock House, South, Tavistock Square, London, W.C. 1, England.

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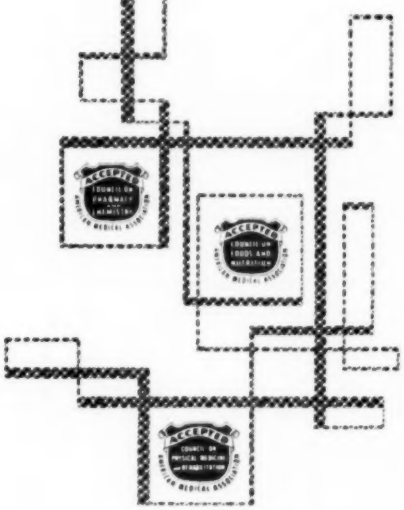

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(Address all inquiries to the Office of the Surgeon General, Department of the Army, Washington 25, D.C.)		e	49 wks.	Mar.-Sept.	26	None	Certificate
Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, and Brooke, Walter Reed and Letterman Army Hospitals	Charles D. Shields, Lt. Col., M.C., and Vann S. Taylor, Major, M.C.	Affiliated with Medical Field Service School					
	Agnes P. Snyder, Major, WMSC	Affiliated with Medical Field Service School					
Nonfederal							
Childrens Hospital, Los Angeles*	S. S. Matthews, M.D.	a-b-d	14 mos.	Sept [4]	14	$200	Cert. or Degree
	Mrs. Mary J. Dodge						
College of Medical Evangelists, Los Angeles*	F. B. Moor, M.D.	a-b-c	15 mos.	Sept	16	$300	Cert. or Degree
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University of Southern California, Los Angeles*	C. L. Lowman, M.D.	a-b-d	14 mos.	Sept	16	Univer.	Certificate
	Charlotte W. Anderson	f	4 yrs.	FebSept	6	Univer.	Cert. & Degree
University of California School of Medicine, San Francisco*	Lucile Eising, M.D.	d	12 mos.	Sept	16	$220[3]	Cert. or Degree
	Margery L. Wagner						
Stanford University, Stanford University, Calif.*	W. H. Northway, M.D.	a-d-e	12 mos.	Varies	29	$690	Certificate
	Lucille Daniels	f	4 yrs.	Sept	16	$220 qr.	Degree
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Northwestern University Medical School, Chicago	E. D. W. Hauser, M.D.	a-b-d	12 mos.	Oct	16	$450	Certificate
	Elizabeth C. Wood						
State University of Iowa College of Medicine, Iowa City*	W. D. Paul, M.D.	e	12 mos.	Sept	20	$200	Certificate
	Olive C. Farr						
Charity Hospital of Louisiana, New Orleans, La	Nathan H. Polmer, M.D.	a-b	14 mos.	Sept	....	None[4]	
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	Shirley M. Cogland	f	4½ yrs.	Sept			Degree
Boston University College of Physical Education for Women, Sargent College, Cambridge, Mass.	Kenneth Christophe, M.D.	c-d-e-f	1-2-4 yrs.	Sept	30	Univer.	Cert. or Degree
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Bouve-Boston School in affiliation with Tufts College, Medford, Mass.	Howard Moore, M.D.	f	4 yrs.	Sept	16	$550	Dipl. & Degree
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Division of Physical Therapy of the School of Auxiliary Medical Services of the University of Pennsylvania, Philadelphia*	G. M. Piersol, M.D.	e	12 mos.	FebSept	32	$600	Certificate
	Dorothy E. Baethke	f	4 yrs.	Sept	40	$600	Cert. & Degree
Baylor Hospital, Dallas, Texas	Edward M. Krusen, Jr., M.D.	a-b-c	12 mos.	Sept	12	$300	Certificate
	Peggy J. Dyer						
University of Texas School of Medicine, Galveston*	G. W. N. Eggers, M.D.	a-b-d	12 mos.	Jan	8	$149[3]	Cert. or Degree
	Ruby Decker						
Hermann Hospital, Houston, Texas*	O. O. Selke, Jr., M.D.	a-b-d	12 mos.	Oct	15	$300	Certificate
	Elizabeth Barkley						
Baruch Center of Physical Medicine and Rehabilitation, Medical College of Virginia, Richmond*	Herbert Park, M.D.	a-b-d	12 mos.	Sept	62	$300[3]	Diploma
	Susanne Hirt	f	4 yrs.	Sept			Degree
University of Wisconsin Medical School, Madison*	R. D. Bouman, M.D.	a-b-d	12 mos.	Sept	22	$60	Certificate
	Margaret A. Kohli	f	4 yrs.	FebSept	10	Semes.[5]	Cert. & Degree

**Reprinted in part J. A. M. A. 146:197 (May 12) 1951. Revised to May 10, 1952.

1. Courses are so arranged that any of the entrance requirements will qualify students for training. a = Graduation from accredited school of nursing; b = Graduation from accredited school of physical education; c = Two years of college with science courses; d = Three years of college with science courses; e = Four years of college with science course; f = High school graduation.

2. Nonresidents charged additional fee.

*Male as well as female students admitted.

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University of Southern California, Los Angeles*	Margaret S. Rood	Degree	18 mos.	Varies	$594	Certificate
Mills College, Oakland, Calif.	J. B. Armstrong, M.D.	High sch.	5 yrs.	Varies	$540	Cert. & Deg.
San Jose State College, San Jose, Calif.*	Elsa H. Hill	Degree	2½ yrs.	FebSept	$250	Certificate
		High sch.	4 yrs.	FebSept	$650	Cert. & Deg.
Colorado Agricultural and Mechanical College, Fort Collins, Colo.*	Mary D. Booth	Degree	18 mos.	Varies	$ 28.50	Certificate
University of Illinois College of Medicine, Chicago*	Charles Ianne, M.D.	High sch.	45 mos.	Varies	$ 28.50	Cert. & Deg.
State University of Iowa, Iowa City*	Marjorie Ball	Degree	2 yrs.	Varies	$147[2]	Certificate
University of Kansas, Lawrence	W. R. Conte, M.D.	High sch.	5 yrs.	Varies	$181[2]	Cert. & Deg.
Boston School of Occupational Therapy, 7 Harcourt St., Boston*	Beatrice D. Wade	High sch.	5 yrs.	MarSept	$110	Degree
Wayne University, Detroit*	S. W. Olson, M.D.	.....	.....	.....	.....	.....
Kalamazoo School of Occupational Therapy, Kalamazoo, Mich.*	Elizabeth Huntsberry	.....	19 mos.	FebSept	$ 78[2]	Certificate
Michigan State Normal College, Ypsilanti, Mich.*	W. M. Fowler, M.D.	High sch.	46 mos.	FebSept	$ 78[2]	Cert. & Deg.
University of Minnesota, Minneapolis*	Nancie B. Greenman	High sch.	45 mos.	FebSept	$110[2]	Degree
College of St. Catherine, 2004 Randolph Ave., St. Paul	D. L. Rose, M.D.	.....	.....	.....	.....	.....
Washington University School of Medicine, St. Louis*	Marjorie B. Greene	Degree	2 yrs.	Sept	$500	Certificate
University of New Hampshire, Durham*	A. W. Reggio, M.D.	High sch.	5 yrs.	Sept	$500	Degree
Columbia University College of Physicians and Surgeons, New York City*	Barbara Jewett	Degree	19 mos.	Varies	$150	Certificate
New York University School of Education, New York City*	F. A. Weiser, M.D.	High sch.	46 mos.	Varies	$150	Degree
Ohio State University, Columbus*	Marion R. Spear	Degree	18 mos.	FebSept	$ 75[2]	Certificate
Philadelphia School of Occupational Therapy of the School of Auxiliary Medical Services of the University of Pennsylvania, Philadelphia*	Donald May, M.D.	1 yr. coll.	4 yrs.	FebSept	$ 75[2]	Cert. & Deg.
Texas State College for Women, Denton	Frances Herrick	High sch.	5 yrs.	Sept	$140[2]	Cert. & Deg.
Richmond Professional Institute, 901 W. Franklin St., Richmond, Va.*	J. W. Rae, Jr., M.D.	.....	.....	.....	.....	.....
College of Puget Sound, N. 15th and Warner Sts., Tacoma, Wash.*	Borghild Hansen	High sch.	40 mos.	Sept	$149.55	Degree
University of Wisconsin, Madison*	F. J. Kottke, M.D.	.....	.....	.....	.....	.....
Milwaukee-Downer College, Dept. of Occupational Therapy, 2512 E. Hartford Ave., Milwaukee	Sister Jeanne Marie	Degree	16 mos.	Varies	$240	Degree
Mount Mary College, 92d and Burleigh, Milwaukee	J. M. Ryan, M.D.	High sch.	5 yrs.	Varies	$240	Degree
	Erna L. Rozmarynowski	Degree	19 mos.	Sept	{ Univer-	Certificate
	R. A. Moore, M.D.	2 yrs. coll.	28 mos.	Sept	} sity	Degree
	Esther Drew	High sch.	5 yrs.	Sept	$250[2]	Cert. & Deg.
	J. A. MacDonald, M.D.	.....	.....	.....	.....	.....
	Marie L. Franciscus	Degree	17 mos.	Sept	$600	Certificate
	W. B. Snow, M.D.	2 yrs. coll.	27 mos.	Sept	$600	Degree
	Frieda J. Behlen	1 yr. coll.	.....	FebSept	{ Univer-	Certificate
	John Sawhill, M.D.	High sch.	4½ yrs.	FebSept	} sity	Cert. & Deg.
	Barbara Locher	High sch.	4 yrs.	Varies	University	Degree
	R. E. Worden, M.D.	.....	.....	.....	.....	.....
	Helen S. Willard	Degree	18 mos.	Sept	$600	Certificate
	J. C. Yaskin, M.D.	High sch.	5 yrs.	Sept	$600	Cert. & Deg.
	Fanny B. Vanderkooi	Degree	18 mos.	FebSept	.....	Certificate
	O. T. Woods, M.D.	High sch.	5 yrs.	FebSept	$ 50[2]	Degree
	H. Elizabeth Messick	Degree	10-18 mos.	FebSept	$182+	Certificate
	I. E. Barrett, M.D.	High sch.	5 yrs.	Sept	$200	Degree
	Edna-Ellen Bell	1-4 yrs. coll.	2-3 yrs.	Jan-Sept	$350	Certificate
	T. H. Duerfeldt, M.D.	High sch.	5 yrs.	Jan-Sept	$350	Cert. & Deg.
	Caroline C. Thompson	High sch.	5 yrs.	Sept	$150[2]	Cert. & Deg.
	H. D. Bouman, M.D.	.....	.....	.....	.....	.....
	Henrietta W. McNary	2 yrs. coll.	3 yrs.	Sept	$350	Certificate
	M. C. Borman, M.D.	High sch.	5 yrs.	Sept	$350	Degree
	Sister Mary Arthur	High sch.	5 yrs.	Sept	$310	Cert. & Deg.
	J. C. Griffith, M.D.	.....	.....	.....	.....	.....

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1. Duration of course is expressed in academic years or in number of months.

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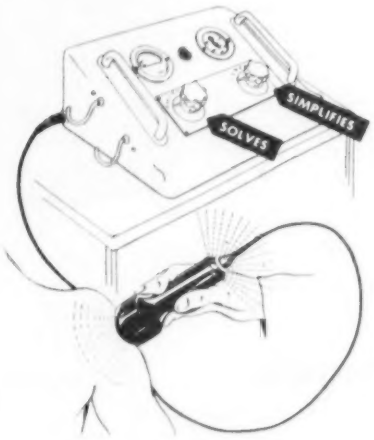

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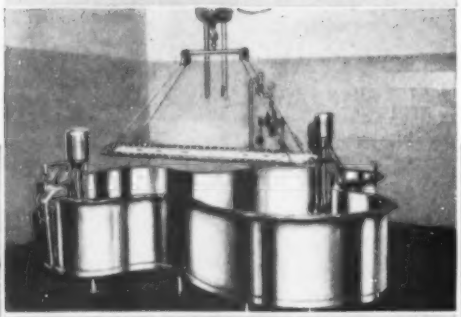

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